ORIGINAL TO GENERAL FILES

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

OFFICE OF DESIGN POLICY & SUPPORT
INTERDEPARTMENTAL CORRESPONDENCE

FILE P.I. # 0007402
CSSTP-0007-00(402)
Chatham County
GDOT District 5 - Jesup
CS 1504/Gwinnett St. from Stiles Ave. to I-16

OFFICE Design Policy & Support

DATE 2/5/2013

FROM for Brent Story, State Design Policy Engineer

TO SEE DISTRIBUTION

SUBJECT **APPROVED REVISED CONCEPT REPORT**

Attached is the approved Revised Concept Report for the above subject project.

Attachment

DISTRIBUTION:

Bobby Hilliard, Program Control Administrator
Genetha Rice-Singleton, State Program Delivery Engineer
Glenn Bowman, State Environmental Administrator
Cindy VanDyke, State Transportation Planning Administrator
Ben Rabun, State Bridge Engineer
Kathy Zahul, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Charles "Chuck" Hasty, State Materials Engineer
Jeff Baker, State Utilities Engineer
Ken Thompson, Statewide Location Bureau Chief
Tamaya Huff, State Pedestrian and Bicycle Coordinator
Karon Ivery, District Engineer
Bradford Saxon, District Preconstruction Engineer
Stephen Thomas, District Utilities Engineer
Aghdas Ghazi, Project Manager
BOARD MEMBER - 1st Congressional District

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
REVISED PROJECT CONCEPT REPORT

Project Type:	Reconstruction/ Rehabilitation	P.I. Number:	0007402
GDOT District:	5	County:	Chatham
Federal Route Number:	N/A	State Route Number:	N/A

Significant changes to the concept are the change from 4 lane reconstruction to 2 lane reconstruction, a reduction in project length to the west of Stiles Avenue and a lengthening of the bridge over Springfield Canal. Loss of proposed development has removed the justification for additional lanes, so the project is now for two lane reconstruction to elevate the pavement above flood elevations and to provide for planned infrastructure improvements. The bridge has been lengthened to account for planned Springfield Canal widening for storm drainage and recreational purposes.

Submitted for approval:

Consultant Designer and Firm — DATE: October 25, 2012

Local Government — DATE: October 29, 2012

Office Head — DATE: 11/15/2012

GDOT Project Manager — DATE: October 29, 2012

Recommendation for approval:

GLENN BOWMAN * — State Environmental Administrator — DATE: 12/11/13

BEN RABUN * — State Bridge Design Engineer — DATE: 1/23/13

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Plan (RTP) and/or the State Transportation Improvement Program (STIP).

CINDY VAN DYKE * — State Transportation Planning Administrator — DATE: 11/20/13

* RECOMMENDATION ON FILE

PLANNING, APPROVED CONCEPT, & BACKGROUND DATA

Project Justification Statement:

CS 1504 (Gwinnett Street) is a major urban arterial facilitating the movement of east/west traffic between residential portions of West Savannah and Garden City to the west and Savannah's downtown and Historic District to the east. The roadway also provides access between downtown and the City of Savannah public works facility located at the intersection of Gwinnett Street with Stiles Avenue. Gwinnett Street is a Chatham Area Transit bus route and is identified as a future bicycle corridor in the Chatham County Bikeway Plan, adapted by the Savannah MPO and amended in 2006. The segment of Gwinnett Street included in this project begins at Stiles Avenue and extends in an easterly direction approximately 0.40 mile, tieing back to the existing roadway near the westbound ramp to I-16. Two schools and a public housing complex are located just outside the project limits.

The Springfield Canal, a major stormwater conveyance for the City of Savannah, crosses Gwinnett Street within the project limits. Due to the limited capacity of the channel and the low elevations to the east of it, out of bank flow frequently occurs in the project area. When this occurs, the roadway is flooded, and can remain closed to traffic for days. The City of Savannah, in cooperation with the Metropolitan Planning Commission, the Chatham County MPO, originated the project as a means of eliminating this flooding and with it the accompanying road closures and traffic rerouting/congestion. The project was added to the program in June 2005 at the request of the City of Savannah and the MPO. The project is listed in the Savannah TIP and Long Range Transportation Plan.

As noted above, the primary issue to be addressed by the project is the flooding of the roadway by overflow from the Springfield Canal. This in turn will address traffic related issues associated with the road closures associated by the flooding. The project will also include infrastructure improvements which will be required to accommodate future drainage improvements and recreational development along the Springfield Canal. At this time no other transportation related projects are planned for this location.

Elevations in the lowest sections of the project reach 4 MSL .With floodwater elevations exceeding 7, as much as 3 feet of water can be across the roadway. Elevations to the east and west of this section are significantly higher and do not flood. The proposed project begins at the intersection of Gwinnett Street with Stiles Avenue and extends to connect to existing improved Gwinnett Street just west of the westbound ramp to I-16. The project length is 0.40 miles. The project begins at Stiles Avenue because it is the nearest point beyond the section of increased elevation where the improvements of the project could reasonably begin. Likewise, the eastern terminus is already at the necessary elevations and has other improvements (sidewalk, etc.).

Failure to complete the project will lead to continued road closures associated with flooding. It will also result in the need to accomplish this as part of later projects associated with drainage infrastructure and recreational development along the canal.

The major performance goal of the project will be the elevation of the roadway surface above floodwater limits, allowing for continued traffic movement and eliminating the potential for roadway repair work due to inundation. The project will also elevate the road sufficiently and provide adequate bridge length and clearance to accommodate future City projects. Secondary benefits to be provided include:

- Improved pedestrian access along the project length. Although the existing roadway has intermittent sidewalks, they are not continuous and do not provide adequate pedestrian access.
- Improved bicycle access through the corridor.
- Improved traffic operations at Stiles and Gwinnett.

Description of the approved concept:

The approved revised concept consists of widening Gwinnett Street to a 4 lane divided highway with a 20' raised median with Type A median opening. On-street parking would be provided at designated locations. The roadway will have curb and gutter and 5' wide sidewalks on both the north and south sides. A new bridge will be provided to cross over the Springfield Canal. Right turn lanes will be provided at the westbound I-16 ramp and at Stiles Avenue. U-turn capacity will be provided at median breaks.

The project begins approximately 375 feet west of the intersection of Gwinnett Street with Stiles Avenue and extends easterly to the intersection with West Boundary Street and the I-16 westbound ramp. The total project length is 0.40 miles. The entire project is within the limits of the City of Savannah.

PDP Classification: ☐ Major ☒ Minor

Federal Oversight: ☐ Full Oversight ☒ Exempt ☐ State Funded ☐ Other

Projected Traffic as shown in the approved Concept Report:

Open Year (2011)
No Development: 10,200
100% Buildout: 17,910

Design Year (2031)
No Development: 11,100
100% Buildout: 18,890

Updated Traffic:

Open Year (2016): 8,050

Design Year (2036): 10,180

Functional Classification (Mainline): Minor Urban Arterial

VE Study anticipated: ☒ No ☐ Yes ☐ Completed – Date:

MAJOR STRUCTURES

Structure:	Existing:	Proposed:
051-0057-0	The existing bridge structure consists of two 14' corrugated metal pipe arches with associated end treatments and parapets. The total bridge length is 38'. The travel lanes are 12' wide. The latest sufficiency rating is 88.12.	The proposed bridge is 220 feet long. There will be two 11' wide travel lanes, with a 4' bike lane, 2' gutter replacement, 7.5' sidewalk, and 1'1½" barrier on each side. The total width of the deck would be 51'.

PROPOSED REVISIONS

Approved Features:	Proposed Features:
The features of the revised approved project concept which will be further revised are: • Typical Section – The current proposed typical section consists of the widening of the existing 2-lane roadway to a 4-lane divided roadway with a 20' raised median, type A median openings and urban shoulders with curb and gutter and sidewalk. The roadway lane width will be 11'. For the roadway segment east of Springfield Canal, the shoulder width will be 18'6"; west of Springfield Canal the shoulder width will be 12'. East of Springfield Canal there will be an 8' wide landscaped strip between curb and sidewalk; west of Springfield Canal there will be a 2' wide grassed strip. For most of the segment east of Springfield Canal, there is an 8' wide parking lane on both sides of the roadway. • Project Termini – The current project begins 375' west of the intersection of Gwinnett Street with Stiles Avenue and ends at the intersection of Gwinnett Street with West Boundary Street and the westbound ramp to I-16.	Typical Section – The roadway will be reconstructed with two 11' wide travel lanes, one in each direction, with adjustments to match existing roadway features at the termini. Also, since the route is part of the City of Savannah's overall bicycle corridor plan, the roadway will have a 4' wide dedicated bike lane outside the travel lane in each direction. The shoulder shall be 12' wide, with 30" curb and gutter, 2' grass strip and 5' sidewalks on each side. Project termini – The project will begin at the intersection of Gwinnett Street with Stiles Avenue and will end 280' west of the intersection of Gwinnett Street with West Boundary Street/I-16 westbound ramp. The total project length is 0.28 mile. Right-of-Way – The reduction from four lanes to two lanes and the alignment change will reduce the amount of acquisition required on both the north and south sides of the roadway. However, this is not expected to have a significant impact on any of the environmental studies. Alignment – The proposed roadway will essentially match the alignment and layout of the existing

• Right-of-Way – The approved revised concept calls for the acquisition of property both north and south of the existing right-of-way. • Revised alignment – The segment of the roadway west of Springfield Canal has the westbound lanes on the approximate location of the existing roadway, with the median and eastbound lanes constructed to the south. East of the Springfield Canal, the alignment shifts so that the median is on the location of the existing lanes, with widening to both the north and south.	roadway. The existing bridge structure (051-0057-0) will be removed. The proposed bridge will be lengthened from 120' to 220' to accommodate future expansion of the Springfield Canal to a width of 150 feet and the addition of a 10' multi-use trail parallel to the channel. The proposed bridge deck width is 51'.
Reason(s) for change: The proposed widening was based on increased traffic expected to result from major developments planned for the roadway corridor. Economic conditions and changes in City priorities have eliminated these increases, so only two lanes are needed for current and future traffic. The roadway elevations will be increased to raise the pavement above flooding elevations, ensuring continuity of service, and to meet bridge height requirements. The bridge itself will be lengthened to accommodate planned storm drainage and recreational infrastructure improvements along the Springfield Canal. The travel lane width will remain at 11'. A 4' wide bike lane will be added outside of each travel lane to provide improved bicycle access along a City designated bicycle route.	

ENVIRONMENTAL

Air Quality:

Is the project located in a PM 2.5 Non-attainment area? ☒ No ☐ Yes
Is the project located in an Ozone Non-attainment area? ☒ No ☐ Yes

Potential environmental impacts of proposed revision: The proposed revisions will reduce the footprint of the roadway and the amount of required right-of-way. However, given the nature of the corridor, this is not expected to change the environmental impacts of the project. The revisions are expected to extend the project schedule by 18 months.

Have proposed revisions been reviewed by environmental staff? ☒ No ☐ Yes

Environmental responsibilities (Studies/Documents/Permits): HGBD as consultant to the City of Savannah will be responsible for completing the environmental document.

PROJECT COST & ADDITIONAL INFORMATION

Updated Cost Estimate		Date of Estimate
Base Construction Cost:	2,199,561.39	9-17-12
Engineering and Inspection:	109,978.07	Base x 5%
Liquid AC Adjustment:	53,399.21	
Total Construction Cost:	2,362,938.67	
Right-of-Way:	469,775	8-3-12
Utilities (reimbursable costs):	0	1-11-13
Environmental Mitigation:	5,500	1-8-13
TOTAL PROJECT COST:	**2,838,213.67**	

Recommendation: Recommend that the proposed revision to the concept be approved for implementation.

Comments:

Attachments:

1. Sketch map
2. Cost Estimate
3. Revised typical section
4. Bridge typical section
5. Existing bridge SIA
6. Revised Traffic Report
7. Revised concept layout

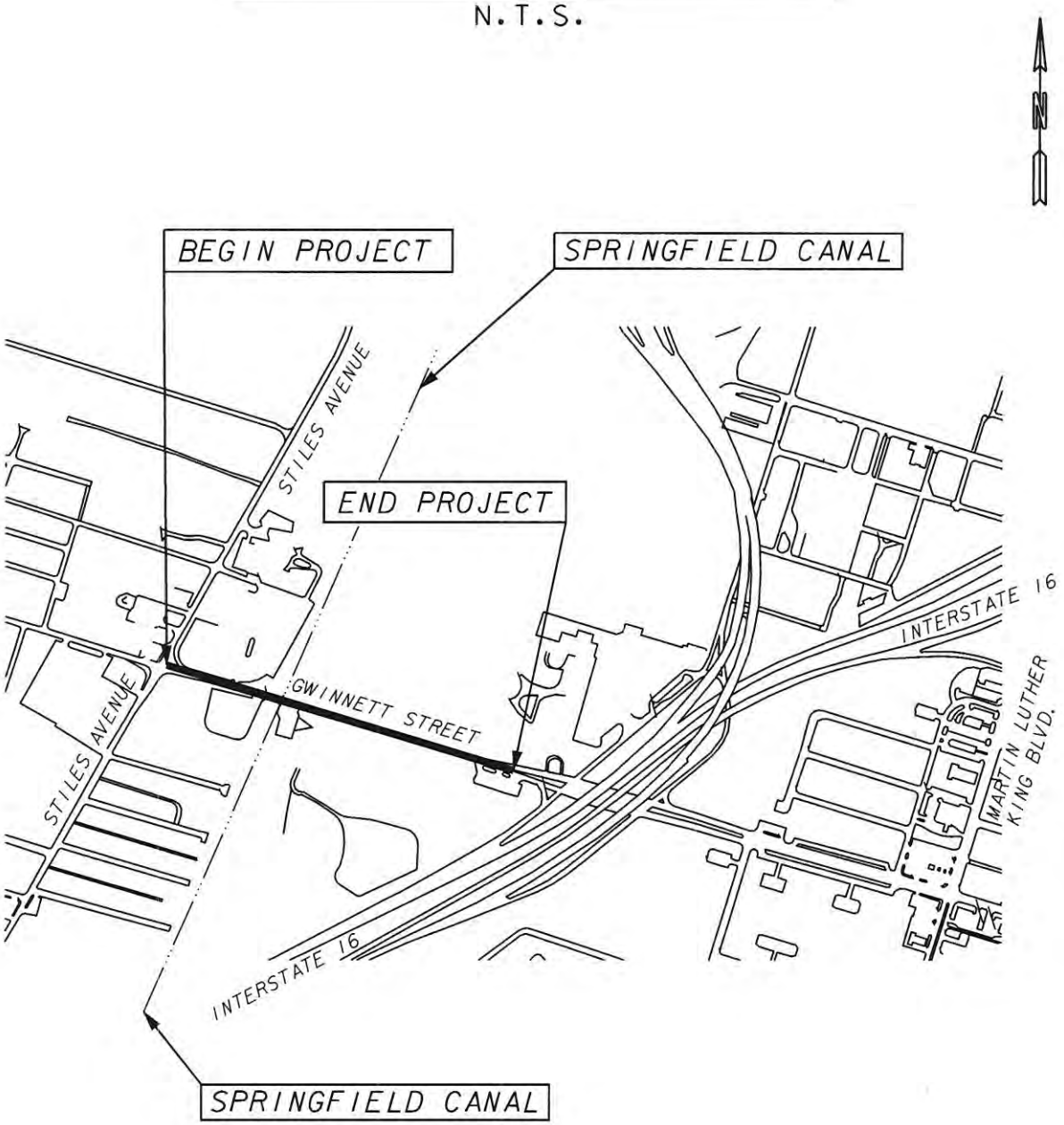
APPROVALS

Concur: _____
Director of Engineering

Approve: _____ 2/4/13
Chief Engineer Date

PROJECT LOCATION MAP

N.T.S.



JOB ESTIMATE REPORT

JOB NUMBER : 0007402 SPEC YEAR: 01
DESCRIPTION: GWINNETT STREET WIDENING

***** This job contains obsolete items *****

ITEMS FOR JOB 0007402

LINE	ITEM	ALT	UNITS	DESCRIPTION	QUANTITY	PRICE	AMOUNT
0005	150-1000		LS	TRAFFIC CONTROL - CSSTP-0007-00 (402)	1.000	75000.00	75000.00
0010	207-0203		CY	FOUND BKFILL MATL, TP II	600.000	46.05	27630.00
0015	210-0100		LS	GRADING COMPLETE - CSSTP-0007-00 (402)	1.000	300000.00	300000.00
0020	318-3000		TN	AGGR SURF CRS	1000.000	27.76	27760.00
0025	432-5010		SY	MILL ASPH CONC PVMT,VARB DEPTH	1200.000	5.00	6000.00
0030	433-1000		SY	REINF CONC APPROACH SLAB	190.000	170.28	32353.20
0035	441-0016		SY	DRIVEWAY CONCRETE, 6 IN TK	330.000	36.37	12002.10
0040	441-0104		SY	CONC SIDEWALK, 4 IN	1700.000	30.00	51000.00
0045	441-0740		SY	CONC MEDIAN, 4 IN	100.000	31.50	3150.00
0055	441-4030		SY	CONC VALLEY GUTTER, 8 IN	240.000	53.98	12955.20
0060	441-5002		LF	CONC HEADER CURB, 6", TP 2	500.000	11.90	5950.00
0065	441-6222		LF	CONC CURB & GUTTER/ 8"X30"TP2	3300.000	15.00	49500.00
0070	441-6740		LF	CONC CURB & GUTTER/ 8"X30" TP7	300.000	12.53	3759.00
0075	444-1000		LF	SAWED JTS IN EXIST PVMTS - PCC	500.000	3.00	1500.00
0080	455-1000		SY	FILTER FAB/EMBANKMENT STAB	500.000	4.78	2390.00
0085	500-3200		CY	CL B CONC	10.000	382.22	3822.23
0090	500-3201		CY	CL B CONC, RET WALL	30.000	505.03	15151.07
0095	550-1150		LF	STM DR PIPE 15",H 1-10	80.000	44.66	3573.39
0100	550-1180		LF	STM DR PIPE 18",H 1-10	1240.000	28.68	35563.20
0105	550-1240		LF	STM DR PIPE 24",H 1-10	1200.000	35.17	42207.17
0110	550-1300		LF	STM DR PIPE 30",H 1-10	480.000	49.02	23530.86
0115	550-4230		EA	FLARED END SECT 30 IN, ST DR	2.000	871.13	1742.26
0120	611-4001		EA	RECONSTR MINOR DRAINAGE STR	5.000	1235.39	6176.97
0125	611-8050		EA	ADJUST MANHOLE TO GRADE	3.000	863.70	2591.11
0130	634-1200		EA	RIGHT OF WAY MARKERS	20.000	100.00	2000.00
0135	641-1100		LF	GUARDRAIL, TP T	100.000	54.47	5447.80
0140	641-1200		LF	GUARDRAIL, TP W	290.000	18.67	5416.97
0145	641-5001		EA	GUARDRAIL ANCHORAGE, TP 1	3.000	641.66	1925.00
0150	641-5012		EA	GUARDRAIL ANCHORAGE, TP 12	1.000	1881.08	1881.09
0155	643-1151		LF	CH LK FEN,ZC COAT, 6', 6 GA	660.000	28.49	18803.40
0160	643-1171		LF	CH LK FEN, ZC COAT, 8', 9 GA	1350.000	31.57	42626.94
0165	643-8210		LF	WOOD FENCE -	160.000	19.20	3072.55
0170	668-1100		EA	CATCH BASIN, GP 1	20.000	2045.28	40905.60
0175	668-1110		LF	CATCH BASIN, GP 1, ADDL DEPTH	52.000	162.78	8464.74
0180	668-2100		EA	DROP INLET, GP 1	15.000	1857.95	27869.25
0185	668-2105		EA	DROP INLET, GP 1, SPCL DES	4.000	1707.50	6830.03
0190	668-4300		EA	STORM SEW MANHOLE, TP 1	2.000	1845.64	3691.28
0195	668-4311		LF	ST SEW MANHOLE,TP 1,A DEP,CL 1	8.000	216.55	1732.41
0200	668-7015		EA	DRAIN INLET, 15 IN	16.000	1701.21	27219.51
0205	670-0670		EA	BUTTERFLY VALVE, 24 IN	1.000	7135.00	7135.00
0210	670-1080		LF	WATER MAIN, 8 IN	104.000	48.17	5010.56
0215	670-1160		LF	WATER MAIN, 16 IN	1372.000	70.63	96914.47

JOB ESTIMATE REPORT

0220	670-1240	LF	WATER MAIN, 24 IN	385.000	125.80	48433.00
0225	670-1900	EA	INLINE PLUG -	5.000	2000.00	10000.00
0230	670-2040	EA	GATE VALVE, 4 IN	1.000	898.32	898.33
0235	670-2060	EA	GATE VALVE, 6 IN	4.000	614.84	2459.38
0240	670-2080	EA	GATE VALVE, 8 IN	3.000	1068.98	3206.95
0245	670-4000	EA	FIRE HYDRANT	4.000	2983.31	11933.27
0250	615-1200	LF	DIRECTIONAL BORE - CSSTP-0007-00 (402)	600.000	9.89	5934.52
0255	639-5000	EA	PRESTRESSED CONC STR POLE, TP- CSSTP-0007-00 (402)	4.000	6389.00	25556.00
0260	647-1000	LS	TRAF SIGNAL INSTALLATION NO - CSSTP-0007-00 (402)	1.000	65000.00	65000.00
0270	682-6223	LF	CONDUIT, NONMETL, TP 2, 3 IN	600.000	20.00	12000.00
0275	636-1020	SF	HWY SGN,TP1MAT,REFL SH TP3	40.000	13.64	545.97
0280	636-1033	SF	HWY SIGNS, TP1MAT,REFL SH TP 9	48.000	21.24	1019.86
0285	636-2090	LF	GALV STEEL POSTS, TP 9	250.000	8.00	2001.42
0290	653-0120	EA	THERM PVMT MARK, ARROW, TP 2	10.000	70.00	700.00
0295	653-1501	LF	THERMO SOLID TRAF ST 5 IN, WHI	3800.000	0.36	1368.00
0300	653-1502	LF	THERMO SOLID TRAF ST, 5 IN YEL	3800.000	0.31	1178.00
0310	653-1804	LF	THERM SOLID TRAF STRIPE, 8",WH	400.000	1.72	688.00
0315	653-1704	LF	THERM SOLID TRAF STRIPE,24",WH	180.000	3.55	640.43
0320	653-6004	SY	THERM TRAF STRIPING, WHITE	100.000	3.00	300.00
0325	653-6006	SY	THERM TRAF STRIPING, YELLOW	100.000	3.00	300.00
0330	654-1001	EA	RAISED PVMT MARKERS TP 1	10.000	4.00	40.00
0340	657-1085	LF	PRF PL SD PVT MKG,8",B/W,TP PB	500.000	6.00	3000.00
0350	657-6085	LF	PRF PL SD PVMT MKG,8",B/Y,TPPB	500.000	6.00	3000.00
0360	310-5100	SY	GR AGGR BS CRS 10IN INCL MATL	6500.000	20.70	134550.00
0365	402-1812	TN	RECYL AC LEVELING,INC BM&HL	100.000	83.80	8380.00
0370	402-3103	TN	REC AC 9.5 MM SP,TPII,GP2, INCL BM & H L	550.000	76.82	42251.00
0375	402-3121	TN	RECYL AC 25MM SP,GP1/2,BM&HL	1400.000	68.83	96362.00
0380	402-3190	TN	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	700.000	85.59	59913.00
0385	413-1000	GL	BITUM TACK COAT	1900.000	2.70	5130.00
0395	446-1100	LF	PVMT REF FAB STRIPS, TP2,18 INCH WIDTH	100.000	5.63	563.00
0400	500-9999	CY	CL B CONC,BASE OR PVMT WIDEN	20.000	180.80	3616.13
0405	603-2180	SY	STN DUMPED RIP RAP, TP 3, 12"	40.000	65.02	2601.19
0410	603-7000	SY	PLASTIC FILTER FABRIC	40.000	4.54	181.66
0415	700-6910	AC	PERMANENT GRASSING	1.500	548.00	822.00
0420	700-7000	TN	AGRICULTURAL LIME	5.000	72.00	360.00
0425	700-7010	GL	LIQUID LIME	10.000	18.20	182.00
0430	700-8000	TN	FERTILIZER MIXED GRADE	1.000	415.00	415.00
0435	700-8100	LB	FERTILIZER NITROGEN CONTENT	100.000	3.43	343.00
0440	716-2000	SY	EROSION CONTROL MATS, SLOPES	1500.000	1.55	2325.62
0445	500-0100	SY	GROOVED CONCRETE	780.000	7.00	5460.00
0450	500-1005	LS	SUPERSTR CONCRETE,CL A ,BR NO - CSSTP-0007-00 (402)	1.000	220000.00	220000.00
0455	500-2100	LF	CONCRETE BARRIER	440.000	65.00	28600.00
0460	500-3101	CY	CLASS A CONCRETE	70.000	542.00	37940.00
0465	511-1000	LB	BAR REINF STEEL	26700.000	1.00	26700.00
0470	511-3000	LS	SUPERSTR REINF STEEL, BR NO - CSSTP-0007-00 (402)	1.000	82500.00	82500.00
0475	520-1125	LF	PIL-IN-PL,STEEL H,HP 12 X 53	470.000	45.00	21150.00
0480	520-1147	LF	PIL-IN-PL,STEEL H,HP 14 X 73	1100.000	45.00	49500.00

JOB ESTIMATE REPORT

0485	520-4125	EA	LOAD TEST, STEEL H, HP 12 X 53	1.000	0.80	0.80
0490	520-4147	EA	LOAD TEST, STEEL H, HP 14 X 73	1.000	1.00	1.00
0495	547-2014	LF	PILE ENCASEMENT, 14 IN PILE	330.000	100.00	33000.00
0500	603-2024	SY	STN DUMPED RIP RAP, TP 1, 24"	140.000	58.00	8120.00
0505	603-7000	SY	PLASTIC FILTER FABRIC	140.000	5.00	700.00
0510	163-0232	AC	TEMPORARY GRASSING	1.500	400.00	600.00
0515	163-0240	TN	MULCH	50.000	214.91	10745.74
0520	163-0300	EA	CONSTRUCTION EXIT	4.000	1285.98	5143.94
0525	163-0550	EA	CONS & REM INLET SEDIMENT TRAP	35.000	223.19	7811.78
0530	165-0010	LF	MAINT OF TEMP SILT FENCE, TP A	3300.000	0.90	2983.70
0535	165-0030	LF	MAINT OF TEMP SILT FENCE, TP C	200.000	1.07	214.22
0540	165-0101	EA	MAINT OF CONST EXIT	4.000	507.45	2029.82
0545	165-0105	EA	MAINT OF INLET SEDIMENT TRAP	35.000	72.00	2520.30
0550	167-1000	EA	WATER QUALITY MONITORING AND SAMPLING	2.000	355.42	710.85
0555	167-1500	MO	WATER QUALITY INSPECTIONS	30.000	999.11	29973.56
0560	171-0010	LF	TEMPORARY SILT FENCE, TYPE A	3800.000	2.92	11096.00
0565	171-0030	LF	TEMPORARY SILT FENCE, TYPE C	400.000	4.01	1606.59

ITEM TOTAL 2199561.39
INFLATED ITEM TOTAL 2199561.39

TOTALS FOR JOB 0007402

ESTIMATED COST: 2199561.39
CONTINGENCY PERCENT (0.0): 0.00
ESTIMATED TOTAL: 2199561.39

OBSOLETE ITEMS FOR JOB 0007402

LINE	ITEM
0425	700-7010

PROJ. NO.	CCSTP-0007-00(402)					CALL NO.		
P.I. NO.	0007402							
DATE								
INDEX (TYPE)	**DATE**	**INDEX**		Link to Fuel and AC Index:				
REG. UNLEADED	Jul-12	$ 3.137		http://www.dot.ga.gov/doingbusiness/Materials/Pages/asphaltcementindex.aspx				
DIESEL		$ 3.602						
LIQUID AC		$ 611.00						
LIQUID AC ADJUSTMENTS								
PA=[((APM-APL)/APL)]xTMTxAPL								
Asphalt								
Price Adjustment (PA)						**50407.5**		**$ 50,407.50**
Monthly Asphalt Cement Price month placed (APM)				Max. Cap	60%	$ 977.60		
Monthly Asphalt Cement Price month project let (APL)						$ 611.00		
Total Monthly Tonnage of asphalt cement (TMT)						137.5		
ASPHALT	**Tons**	**%AC**	**AC ton**					
Leveling	100	5.0%	5					
12.5 OGFC		5.0%	0					
12.5 mm		5.0%	0					
9.5 mm SP	550	5.0%	27.5					
25 mm SP	1400	5.0%	70					
19 mm SP	700	5.0%	35					
	2750		**137.5**					
BITUMINOUS TACK COAT								
Price Adjustment (PA)						**$ 2,991.71**		**$ 2,991.71**
Monthly Asphalt Cement Price month placed (APM)				Max. Cap	60%	$ 977.60		
Monthly Asphalt Cement Price month project let (APL)						$ 611.00		
Total Monthly Tonnage of asphalt cement (TMT)						8.160691752		
Bitum Tack								
Gals	gals/ton	tons						
1900	232.8234	8.16069175						
BITUMINOUS TACK COAT (surface treatment)								
Price Adjustment (PA)						**0**		**$ -**
Monthly Asphalt Cement Price month placed (APM)				Max. Cap	60%	$ 977.60		
Monthly Asphalt Cement Price month project let (APL)						$ 611.00		
Total Monthly Tonnage of asphalt cement (TMT)						0		
Bitum Tack	SY	Gals/SY	Gals	gals/ton	tons			
Single Surf. Trmt.		0.20	0	232.8234	0			
Double Surf.Trmt.		0.44	0	232.8234	0			
Triple Surf. Trmt		0.71	0	232.8234	0			
					0			
TOTAL LIQUID AC ADJUSTMENT								**$ 53,399.21**

Preliminary Right of Way Cost Estimate

Date: August 3, 2012
Project: CSSTP-0007-00(402) Chatham County
Existing/Required R/W: Varies 50'-80'/Varies 90'-135'
Project Termini: Stiles Avenue to West of I-16 Ramp/Boundary Street
Project Description: Reconstruction of Gwinnett Street

P.I. Number: 0007402
No. Parcels: 6

Land:

Commercial	36,000	s.f	@ $ 3.50	/s.f. =	$ 126,000
Industrial	27,000	s.f	@ $ 2.50	/s.f. =	$ 67,500
Residential	0	s.f	@ $ 6.00	/s.f. =	$ 0
Agricultural	0	s.f	@ $ 2.00	/s.f. =	$ 0

TOTAL $ 193,500

Improvements:

Relocation:

0 Commercial @ $25,000/parcel = $ 0
0 Residential @ $40,000/parcel = $ 0

TOTAL $ 0

Damages: **Proximity** $ 25,000
Consequential $ 0
Cost to Cure $ 0

TOTAL $ 25,000

SUB-TOTAL: $ 218,500

Net Cost		$	
Scheduling Contingency	55 %	$	126,175
Adm/Court Cost	60 %	$	131,100
TOTAL		$	257,275

Total Cost $ 469,775

Prepared By: Bill Nicholson
Hussey, Gay, Bell & DeYoung

Reviewed / Approved:
Howard P. Copeland
R/W Administrator

Note: Accuracy of estimate is the sole responsibility of the Preparer.
Note: The Market Appreciation (40%) is not included is this Preliminary Cost Estimate.

REVISED: 2-8-08

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE CSSTP-0007-00 (402) Chatham
P.I. # 0007402

OFFICE Jesup
DATE 1/11/13

FROM Stephen Thomas, District Utilities Engineer

TO Adghas Ghazi, Project Manager

SUBJECT PRELIMINARY UTILITY COST (ESTIMATE)

As requested by your office, we are furnishing you with a Preliminary Utility Cost estimate of each utility with facilities potentially located within the above project limits.

Facility Owner	Non-Reimbursable	Reimbursable	Comments
Atlanta Gas Light	$20,000	$0	
ATT/Bellsouth	$100,000	$0	Attached to Bridge
City of Savannah (W&S)	$40,000	$0	
Comcast	$42,240	$0	
Earthlink	$0	$0	
Georgia Power-Dist.	$112,500	$0	
Level3	$0	$0	
Totals	$314,740		
Total Reimbursement		$0	

CC: Angie Robinson, Office of Financial Management;
Terry Brigman, Assistant State Utilities Engineer
District Office File
Utilities Office File

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P.I. No. 0007402 **OFFICE** Environmental Services

DATE January 8, 2013

FROM Glenn Bowman, P.E., State Environmental Administrator

TO Aghdas Ghazi, Project Manager

SUBJECT Preliminary Mitigation Cost Estimate

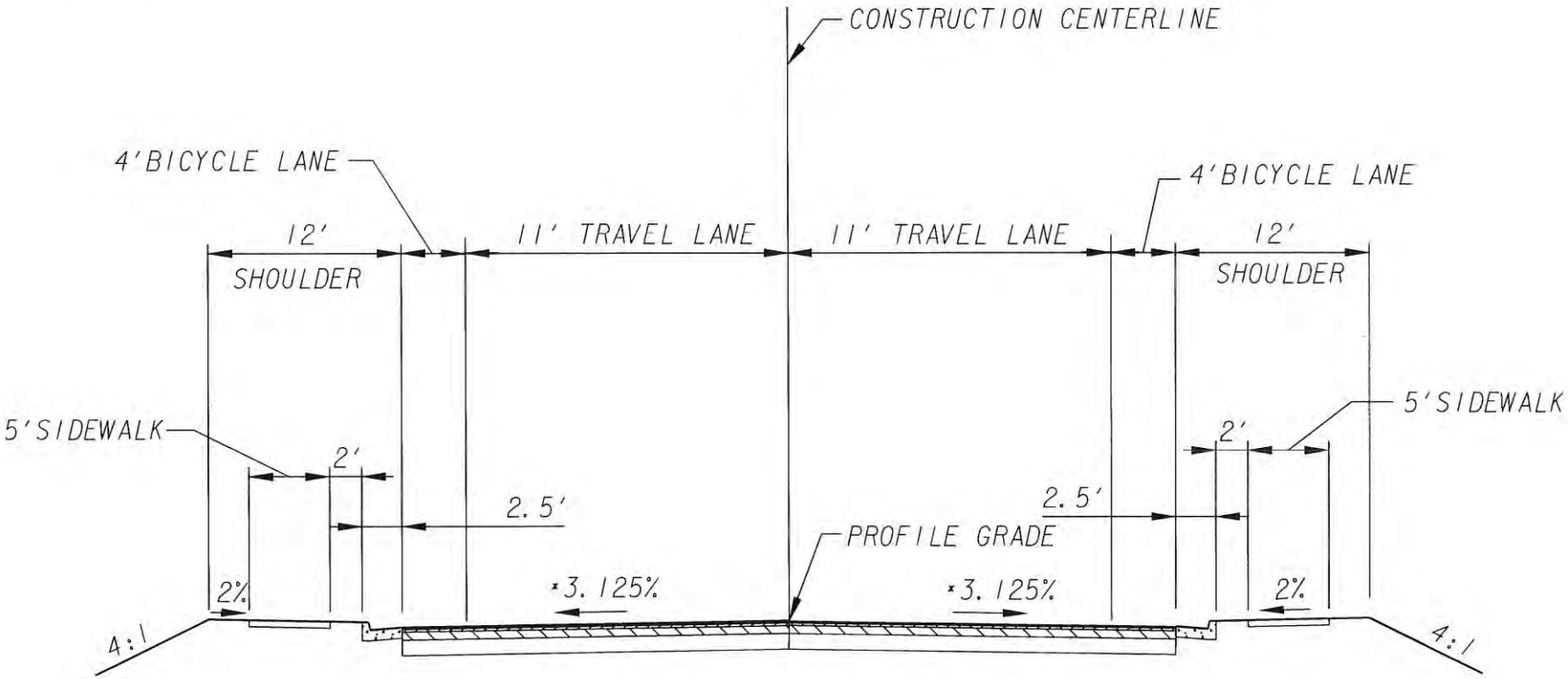
As requested by your office, we are furnishing you with a preliminary cost estimate for the subject project. The project would improve Gwinnett Street including a new bridge over the Springfield Canal in Chatham County, Georgia. After reviewing the NWI mapping and based on the information provided, wetlands could be impacted by the proposed construction activity and mitigation will be required. The estimated cost for mitigation is $5500.00.

DISCLAIMER: This information is based solely on a desktop review of the information available. Only after a field reconnaissance, can a more detailed and accurate cost be estimated.

Thank you for your cooperation and expeditious handling of this matter. If you have any questions or need additional information, please contact Lisa Westberry (404) 631-1772 of our office.

GB/HDC/lmw

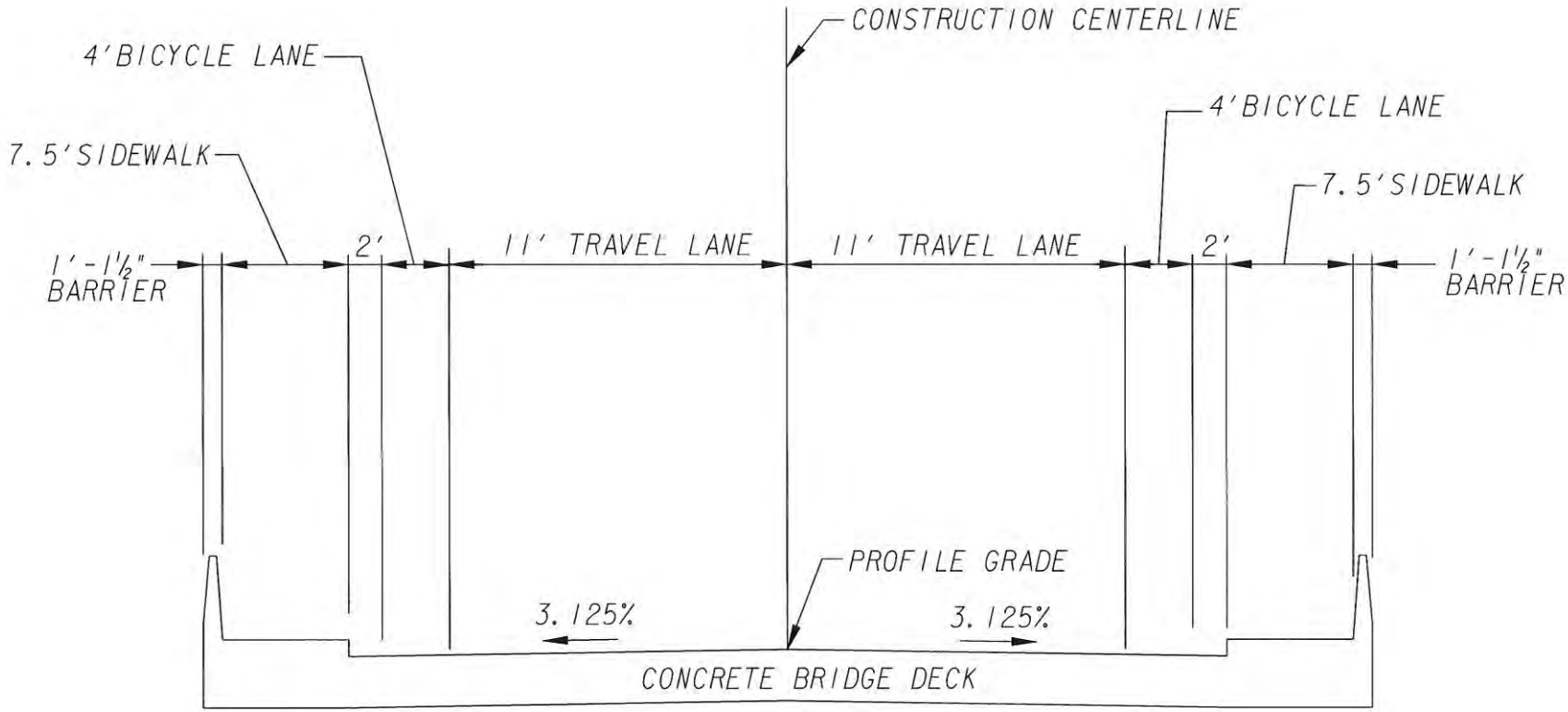
cc: General File
Paul Alimia, GDOT NEPA



GWINNETT STREET TYPICAL SECTION

N.T.S.

*3.125 IS STANDARD CROSS SLOPE FOR CITY OF SAVANNAH STREETS. CITY REQUESTS THAT THIS RATE BE ALLOWED ON PROJECT SINCE IT WILL REMAIN A CITY STREET UPON COMPLETION.



GWINNETT STREET TYPICAL BRIDGE SECTION

N.T.S.

NOTE: SUPERSTRUCTURE NOT SHOWN

Processed Date:1/4/2013

Parameters: Bridge Serial Num

Bridge Inventory Data Listing

Structure ID:051-0057-0 | **Chatham** | **SUFF. RATING:** 88.12

Location & Geography

Structure ID:	051-0057-0
200 Brdge Information:	07
*6A Feature Int:	SPRINGFIELD CANAL
*6B Critical Bridge:	0
*7A Route No Carried:	CS01504
*7B Facility Carried:	GWINNETT STREET
9 Location:	W CITY LIMITS SAVANNAH
2 Dot District:	5
207 Year Photo:	2010
*91 Inspection Frequency:	24 Date: 08/02/2010
92A Fract Crit Insp Freq:	0 Date: 02/01/1901
92B Underwater Insp Freq:	1 Date: 11/30/2011
92C Other Spc. Insp Freq:	0 Date: 02/01/1901
* 4 Place Code:	69000
*5 Inventory Route(O/U):	1
Type:	5
Designation:	1
Number:	04079
Direction:	0
*16 Latitude:	32 04.2820 HMMS Prefix:
*17 Longtitude:	81 -06.7420 HMMS Suffix: MP:0.00
98 Border Bridge:	000%Shared:00
99 ID Number:	000000000000000
*100 STRAHNET:	0
12 Base Highway Network:	1
13A LRS Inventory Route:	513150407
13B Sub Inventory Route:	0
101 parellel Structure:	N
*102 Direction of Traffic:	2
*264 Road Inventory Mile Post:	001.44
*208 Inspection Area:	5 Initials: EFP
Engineer's Initials:	sgm
* Location ID No:	051-04079M-001.44N

*104 Highway System:	0
*26 Functional Classification:	16
*204 Federal Route Type:	M No: 04079
105 Federal Lands Highway:	0
*110 Truck Route:	0
2006 School Bus Route:	1
217 Benchmark Elevation:	0000.00
218 Datum:	0
*19 Bypass Length:	02
*20 Toll:	3
*21 Maintanance:	04
*22 Owner:	04
*31 Design Load:	2
37 Historical Significance:	5
205 Congressional District:	12
27 Year Constructed:	1936
106 Year Reconsrtucted:	0000
33 Bridge Medium:	0
34 Skew:	00
35 Structure Flared:	0
38 Navigation Control:	0
213 Special Steel Design:	0
267 Type of Paint:	0
*42 Type of Service On:	5
Type of Service Under:	5
214 Movable Bridge:	0
203 Type Bridge:	S
259 Pile Encasement	3
*43 Structure Type Main:	3 19
45 No.Spans Main:	002
44 Structure Type Appr:	0 00
46 No Spans Appr:	0000
226 Bridge Curve Horz	0 Vert: 0
111 pier Protection	0
107 Deck Structure Type:	N
108 Wearing Structure Type:	N
Membrane Type:	N
Deck Protection:	N

Signs & Attachments

225 Expansion Joint Type:	00
242 Deck Drains:	0
243 Parapet Location:	0
Height:	0
Width:	0
238 Curb Height:	1
Curb Material:	1
239 Handrail	2 2
*240 Medium Barrier Rail:	0
241 Bridge Median Height:	0
* Bridge Median Width:	0
230 Guardrail Loc. Dir. Rear:	3
Fwrd:	3
Oppo. Dir. Rear:	0
Oppo. Fwrd:	0
244 Aproach Slab	0
224 Retaining Wall:	1
233Posted Speed Limit:	35
236 Warning Sign:	0.00
234 Delineator:	0.00
235 Hazzard Boards:	1
237 Utilities Gas:	00
Water:	32
Electric:	00
Telephone:	32
Sewer:	00
247 Lighting Street:	0
Navigation:	0
Aerial:	0
*248 County Continuity No.:	00

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Bridge Inventory Data Listing

Structure ID:051-0057-0

Programming Data

201 Project No:	UNKNOWN
202 Plans Available:	0
249 Prop Proj No:	00000000000000000000000000
250 Approval Status:	0000
251 PI Number:	0000000
252 Contract Date:	02/01/1901
260 Seismic No:	00000
75 Type Work:	00 0
94 Bridge Imp: Cost:	$0
95 Roadway Imp. Cost:	0
96 Total Imp Cost:	0
76 Imp Length:	000000
97 Imp Year:	0000
114Future ADT:	012570 Year:3930

Hydralic Data

215Waterway Data:	
High Water Elev:	0000.0 Year:1900
Flood Elev:	0000.0 Freq:00
Avg Streambed Elev:	0000.0
Drainage Area:	00000
Area of Opening:	000226
113 Scour Critical	8
216Water Depth:	03.0 Br.Height:04.8
222Slope Protection:	0
221Slope Protection	0 Fwd:0
219Fender System	0
220Dolphin	0
223Current Cover:	1
Type:	2
No. Barrels:	2
* Width:	12.00 Height:12.00
* Length:	36 Apron:0
265 U/W Insp. Area	1 Diver:JWO
Location ID No:	051-04079M-001.44N

Measurements:

*29ADT	008380 Year:3910
109%Trucks:	0
* 28 Lanes On:	02 Under:00
210 No. Tracks On:	00 Under:00
* 48 Max. Span Length	0014
* 49 Structure Length:	37
51 Br. Rwdy. Width	0.00
52 Deck Width:	0.00
* 47 Tot. Horiz. Cl:	37
50 Curb / Sidewalk Width	3.00 / 0.00
32 Approach Rdwy. Width	027
*229 Shoulder Width:	
Rear Lt:	2.00 Type:1 Rt:2.00
Fwd. Lt:	2.00 Type:1 Rt:2.00
Permanent Width:	
Rear:	23.00 Type:1
	23.00 Type:2
Intersection Rear:	1 Fwd: 0
36Safety Features Br. Rail:	2
Transition:	2
App. G. Rail:	2
App. Rail End:	2
53 Minimum Cl. Over:	99' 99"
Under:	
*228 Minimum Vertical Cl	
Act. Odm Dir::	99' 99"
Oppo. Dir:	99' 99"
Posted Odm. Dir:	00' 00"
Oppo. Dir:	00' 00"
55 Lateral Undercl. Rt:	N 0 0
56 Lateral Undercl. Lt:	0.00
*10 Max Min Vert Cl:	99' 99" Dir:0
39 Nav Vert Cl:	000 Horiz:0000
116 Nav Vert Cl Closed:	000
245 Deck Thickness Main	0.00
Deck Thick Approach:	0.00
246 Overlay Thickness:	0.00
212 Year Last Painted:	Sup:0000Sub:0000

65 Inventory Rating Mathod:	0
63 Operating Rating Method:	0
66 Inventory Type:	2 Rating: 27
64 Operating Type:	2 Rating: 27
231Calculated Loads:	
H-Modified:	00 0
HS-Modified:	00 0
Type 3:	00 0
Type 3s2:	00 0
Timber:	00 0
Piggyback:	00 0
261 H Inventory Rating:	15
262 H Operating Rating	25
67 Structural Evaluation:	6
58 Deck Condition::	N
59 Superstructure Condition:	N
* 227 Collision Damage:	0
60A Substructure Condition:	N
60B Scour Condition:	8
60C Underwater Condition	6
71 Waterway Adequacy:	8
61 Channel Protection Cond.:	8
68 Deck Geometry:	N
69 UnderClr. Horz/Vert:	N
72 Appr. Alignment:	8
62 Culvert:	6

Posting Data

70 Bridge Posting Required	5
41 Struct Open, Posted, CL:	A
* 103 Temporary Structure:	0
232 Posted Loads	
H-Modified:	00
HS-Modified:	00
Type 3:	00
Type 3s2:	00
Timber	00
Piggyback	00
253 Notification Date:	02/01/1901
258 Fed Notify Date:	2/1/1901 12:00:00AM

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Gwinnett Street Reconstruction Traffic Study

CSSTP-0007-00(402)
P.I. # 0007402
Chatham County
CS 1504/Gwinnett Street from Stiles Avenue to I-16

PREPARED FOR

The City of Savannah

Overview of the Proposed Gwinnett Street Reconstruction Corridor between Stiles Avenue and Interstate 16

PREPARED BY

Hussey, Gay, Bell & DeYoung, Inc.
Consulting Engineers
Savannah, Georgia

October 23, 2012

A Bell Company

Table of Contents

Introduction 1
Existing Roadway Characteristics 2
Existing Traffic Volumes 3
Historical Traffic Data Analysis 5
Future Traffic Volume Estimation 7
Traffic Analysis Methodology 9
Analysis of Existing Traffic Conditions 10
Analysis of Future Traffic Conditions 10
Signalized Intersection Operational Analysis 11
Determination of Minimum Turn Lane Queue Lengths 12
Conclusion and Recommendations 12

Appendix A: 2012 Field Count Data

Appendix B: HCM Analyses

Appendix C: Traffic Diagrams

Introduction

Gwinnett Street is a *minor urban arterial* facilitating the movement of east-west traffic between residential portions of West Savannah and Garden City to the west and Savannah's downtown and Historic District to the east. The street also provides access between downtown and the City Lot, located on the north side of Gwinnett Street at Stiles Avenue. Significant changes to the original concept include a change from a proposed 4-lane reconstruction to a 2-lane reconstruction between Stiles Avenue and West Boundary Street. Replacement of the existing bridge over the Springfield Canal will also be necessary. The proposed roadway and bridge will be designed with pavement grades and bridge height sufficient to bring both above 100-year flood elevations.

The purpose of this report is to assess future traffic operations along the project corridor and recommend improvements with respect to roadway geometry that will provide adequate capacity to handle future traffic, while maximizing safety for all users of the facility. To accomplish this, the following general procedure was undertaken:

1. Describe the existing roadway characteristics along the project corridor.
2. Determine the magnitudes and characteristics of current traffic along the project corridor.
3. Examine historical traffic data to develop a reasonable growth rate for use in estimating future traffic volumes.
4. Estimate future traffic volumes.
5. Analyze and evaluate current traffic operations along the project corridor.
6. Analyze and evaluate future traffic operations along the project corridor, for the "base year" and "design year".
7. Provide recommendations for improvements that will be required to maintain or improve the current level of service and maximize safety along the project corridor.

Existing Roadway Characteristics

Gwinnett Street is functionally classified as an *urban minor arterial* by the Georgia Department of Transportation (GDOT). The study corridor begins at an intersection with Stiles Avenue and extends eastward for 0.4 miles to an intersection with West Boundary Street, which becomes an eastbound on-ramp for Interstate 16 on the south side of the intersection. The typical section for the segment under study is a two-lane, paved roadway featuring one 12-foot lane in each direction with curb and gutter and raised shoulders (see Figure 1, below). A four foot sidewalk is provided along the south side of the street running the entire length of the corridor. The posted speed limit is 35 mph. The only intersections along the project corridor are those at either end, both of which are signalized. Most of the land adjacent to the roadway is currently undeveloped and driveway access is minimal. The only major feature along the corridor is a single 32-foot bridge over the Springfield Canal, located roughly 575 feet east of the Stiles Avenue intersection.

Figure 1 - Gwinnett Street (looking west, midway along the study corridor)

Gwinnett Street currently facilitates the movement of traffic from nearby businesses, residential neighborhoods, and the City of Savannah's "City Lot" complex to downtown Savannah as well as I-16.

Existing Traffic Volumes

Field counts were obtained in August of 2012. All field count data is included as Appendix A. The counts included the following:

- 24-hour tube counts, including vehicle classification and speed
- Peak hour bike and pedestrian counts for AM, Midday, and PM peak hours

The 24-hour tube count volumes were adjusted using appropriate daily, monthly (seasonal), and axle factors to determine the Average Daily Traffic (ADT) volumes. The ADT volumes are summarized in Table 1.

	Westbound	Eastbound	Total	Directional Dist.
Cars	3,600	3,290	6,890	52%
Trucks	370	420	790	47%
Total	3,970	3,710	**7,680**	52%

Table 1 - 2012 ADT

24-Hour truck percentages were calculated based on the unadjusted field data and are presented as Table 2.

	Westbound	Eastbound	Total
Single Unit Truck Percentages	8.1%	10.5%	9.3%
Combination Truck Percentages	1.2%	0.8%	1.0%
24-Hour Truck Percentages	9.3%	11.3%	10.3%

Table 2 - 24-Hour Truck Percentages

K Factors, truck percentages and directional distributions were calculated for the AM, Midday, and PM peak hours based on the field data and are presented as Table 3.

	K Factor	Truck Pct.	Directional Dist.
AM	5.2%	12.8%	52% (EB)
Midday	6.1%	11.7%	53% (WB)
PM	9.6%	6.2%	52% (WB)

Table 3 – Peak Hour Percentages

Using the peak hour percentages determined based on the unadjusted field data, peak hour volumes were developed for the project corridor and are presented in Tables 4, 5, and 6.

	Westbound	Eastbound	Total	Directional Dist.
Cars	167	182	349	
Trucks	24	27	51	
Total	191	209	400	52% (EB)

Table 4 - 2012 AM Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	218	195	413	
Trucks	29	26	55	
Total	247	221	468	53% (WB)

Table 5 - 2012 Midday Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	359	331	690	
Trucks	24	22	46	
Total	383	353	736	52% (WB)

Table 6 - 2012 PM Peak Hour Volumes

Historical Traffic Data Analysis

Historical ADT volumes for numerous roadways throughout the State are maintained by the Georgia Department of Transportation (GDOT), and were available for three segments of Gwinnett Street. These locations are indicated on Figure 2 along with the GDOT 2011 ADT volumes for each.

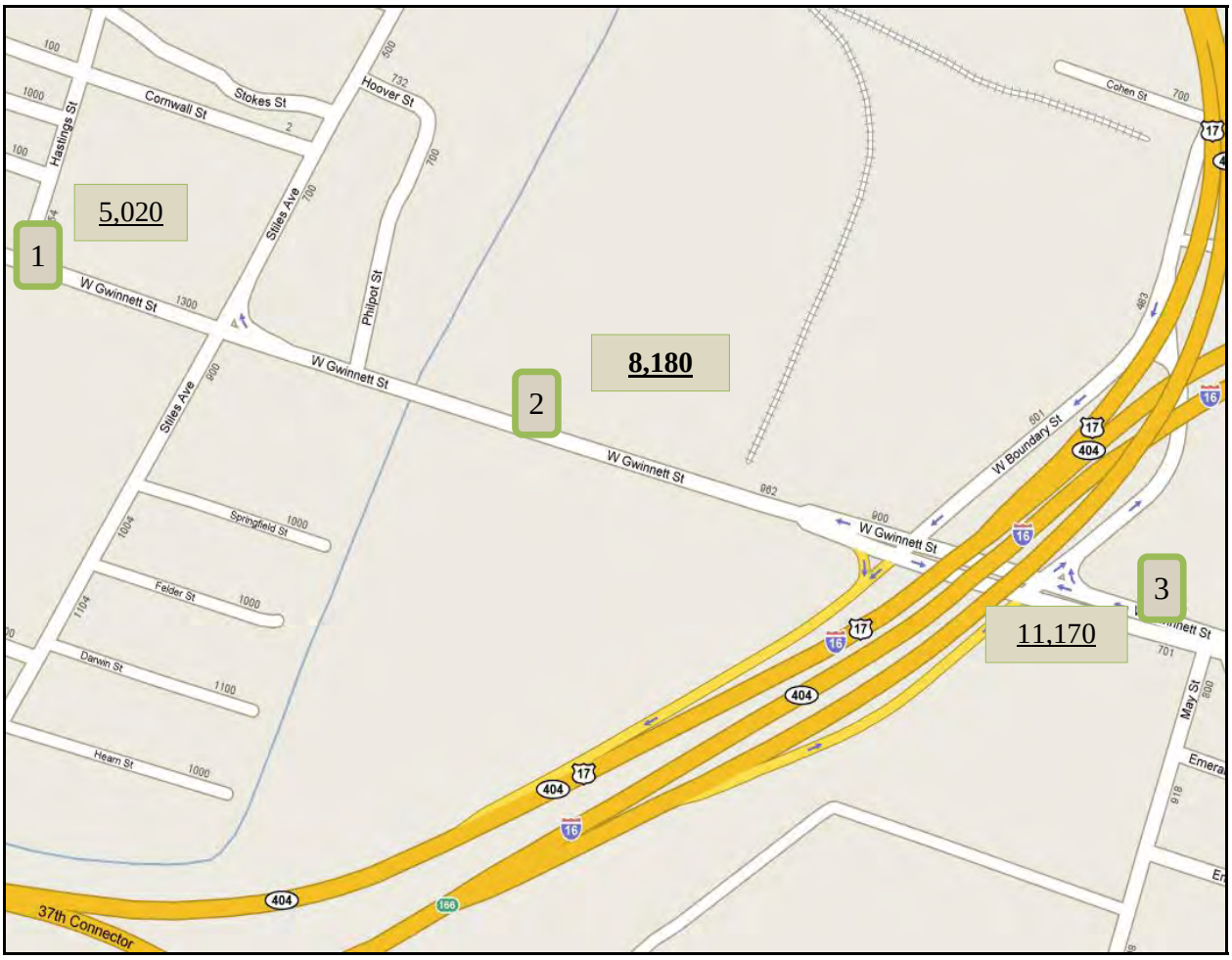

Figure 2 - Historical Count Locations and GDOT 2011 ADT Volumes

Table 7 presents historical non-directional traffic volume data for the years 1997 through 2011 for each of the three segments shown in Figure 2. Traffic data for 1996 was unavailable. Note that Segment 2 includes the entirety of the project corridor under study between Stiles Avenue and West Boundary Street/I-16.

Year	*Segment 1* Collat Avenue to Stiles Avenue	*Segment 2* Stiles Avenue to West Boundary St	*Segment 3* West Boundary St to MLK, Jr. Boulevard
1997	4,020	9,700	12,060
1998	4,070	9,910	9,980
1999	3,910	9,480	9,790
2000	3,940	9,640	10,360
2001	3,750	9,650	10,340
2002	3,820	8,520	9,500
2003	3,600	8,640	9,600
2004	3,600	9,540	11,000
2005	3,600	8,370	10,890
2006	3,610	8,980	10,630
2007	3,640	9,060	11,350
2008	3,550	8,830	11,540
2009	3,560	8,850	11,540
2010	5,140	8,380	11,440
2011	5,020	8,180	11,170

Table 7 - Historical Traffic Volume Data

Least squares regression was used to determine average growth rates for the following three date ranges:

1. 1997 through 2011 (14 years)
2. 2001 through 2011 (10 years)
3. 2006 through 2011 (5 years)

Table 8 presents the regression calculation results. Based on an examination of the regression results, a 1.2% growth rate (the average of 10-year averages for the three segments) was determined to be most appropriate for use in estimating future traffic volumes.

	Segment 1	Segment 2	Segment 3	Average
14 Years	0.9%	-1.1%	0.8%	0.2%
10 Years	2.7%	-0.8%	1.6%	1.2%
5 Years	8.5%	-2.0%	0.8%	2.4%

Table 8 – Corridor Growth Rates Determined Using Least Squares Regression

Future Traffic Volume Estimation

Future volumes for both the 2016 Base Year and the 2036 Design Year were estimated based on the 1.2% growth factor established in the previous section.

Base Year ADT volumes are presented as Table 9. Peak hour volumes are presented as Tables 10, 11, and 12.

	Westbound	Eastbound	Total	Directional Dist.
Cars	3,770	3,450	7,220	52%
Trucks	390	440	830	47%
Total	4,160	3,890	**8,050**	52%

Table 9 - 2016 ADT

	Westbound	Eastbound	Total	Directional Dist.
Cars	175	191	366	
Trucks	25	28	53	
Total	200	219	419	52% (EB)

Table 10 - 2016 AM Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	229	205	434	
Trucks	30	27	57	
Total	259	232	491	53% (WB)

Table 11 - 2016 Midday Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	377	346	723	
Trucks	25	24	49	
Total	402	370	772	52% (WB)

Table 12 - 2016 PM Peak Hour Volumes

Design Year ADT volumes are presented as Table 13. Peak hour volumes are presented as Tables 14, 15, and 16.

	Westbound	Eastbound	Total	Directional Dist.
Cars	4,770	4,360	9,130	52%
Trucks	490	560	1,050	47%
Total	5,260	4,920	**10,180**	52%

Table 13 - 2036 ADT

	Westbound	Eastbound	Total	Directional Dist.
Cars	221	241	462	
Trucks	33	35	68	
Total	254	276	530	52% (EB)

Table 14 - 2036 AM Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	289	260	549	
Trucks	38	34	72	
Total	327	294	621	53% (WB)

Table 15 - 2036 Midday Peak Hour Volumes

	Westbound	Eastbound	Total	Directional Dist.
Cars	478	437	915	
Trucks	31	30	61	
Total	509	467	976	52% (WB)

Table 16 - 2036 PM Peak Hour Volumes

Traffic Analysis Methodology

In order to best assess both the existing traffic situation and the predicted future traffic patterns and to recommend solutions with respect to lane configuration along the project corridor, procedures and methodologies outlined in the Transportation Research Board's 2000 Edition of the Highway Capacity Manual (HCM2000) were employed. The analyses performed for this study were completed using several modules of the McTrans Highway Capacity Software (HCS+, Version 5.4), which automates many of HCM 2000's methodologies.

One of the key evaluation parameters established in HCM 2000, as in all previous editions, is the "level of service" (LOS). Level of service is used as a general qualitative measure of how adequate a particular roadway or intersection configuration performs in handling a given traffic load. The particular criterion used to measure level of service varies depending upon which aspect of traffic flow is being assessed. In this study, both arterial capacity and intersection capacity are examined.

Arterial Level of Service

Arterial level of service is defined in terms of the average travel speed of all through vehicles using the arterial. The average running speed is compared to the free-flow speed. The free-flow speed for any specific arterial depends upon the functional classification. Gwinnett Street is functionally classified as Type II, which is defined as having a free-flow speed in the range of 35 to 45 mph, typically 40 mph. Arterial level of service is generally defined below (with the minimum average speed for a Type II arterial appearing in parentheses after each):

LOS A: Primarily free-flow operations at average travel speeds, typically 90% of the free-flow speed for a particular arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Any delay at a signalized intersection is minimal. (≥ 35 mph)
LOS B: Reasonably unimpeded operations at average travel speeds, typically 70% of the free-flow speed for the arterial classification. A vehicles ability to maneuver in the traffic stream is slightly restricted and signal delays are generally short. (≥ 28 mph)
LOS C: Stable Operations. Ability to maneuver is intermittently restricted. Average travel speeds are roughly 50% of free-flow speed. Signal delays are increasingly common. (≥ 22 mph)
LOS D: Borders on a range wherein small increases in flow can cause substantial increases in approach delay. Delays at signals are to be expected. Average travel speed is 40% of free-flow speed. (≥ 17 mph)
LOS E: Characterized by significant delays and average travel speeds around 33% of free-flow speeds. Long delays can be expected at signals with stop-and-go travel between intersections common. (≥ 13 mph)
LOS F: Extremely slow progression along arterials. Frequent very long delays are experienced at signals with extensive queuing. Average travel speeds are approximately 25% of free-flow speed or less. (< 13 mph)

Analysis of Existing Traffic Conditions

Analysis of the Gwinnett Street corridor's performance as an arterial, using current (2012) traffic volumes was completed using the HCS+ Software's Arterials Planning Analysis module. The analysis results for all three Peak Hour periods are presented as Table 17.

	Planning Analysis Hour Factor	Directional Distribution Factor	Thru-Volume 15 Minute Flow Rate	Average Travel Speed	Urban Street LOS
AM Peak Hour	0.052	0.52	89 v	25.4 mph	C
Midday Peak Hour	0.061	0.53	107 v	25.3 mph	C
PM Peak Hour	0.096	0.52	166 v	24.9 mph	C

Table 17 - Arterial Capacity Analysis Results for Existing Traffic (2012)

Analysis of Future Traffic Conditions

Analysis of the Gwinnett Street corridor's performance as an arterial, using base year (2016) and design year (2036) traffic volumes was completed also using the HCS+ Software's Arterials Planning Analysis module. The analysis results for all three Peak Hour periods are presented as Table 18 and Table 19 for 2016 and 2036 respectively.

	Planning Analysis Hour Factor	Directional Distribution Factor	Thru-Volume 15 Minute Flow Rate	Average Travel Speed	Urban Street LOS
AM Peak Hour	0.052	0.52	94 v	25.4 mph	C
Midday Peak Hour	0.061	0.53	113 v	25.2 mph	C
PM Peak Hour	0.096	0.52	174 v	24.8 mph	C

Table 18 - Arterial Capacity Analysis Results for Base Year Traffic (2016)

	Planning Analysis Hour Factor	Directional Distribution Factor	Thru-Volume 15 Minute Flow Rate	Average Travel Speed	Urban Street LOS
AM Peak Hour	0.052	0.52	119 v	25.2 mph	C
Midday Peak Hour	0.061	0.53	142 v	25.1 mph	C
PM Peak Hour	0.096	0.52	220 v	24.5 mph	C

Table 19 - Arterial Capacity Analysis Results for Design Year Traffic (2036)

Signalized Intersection Operational Analysis

An operational analysis of the Gwinnett Street/Stiles Avenue intersection was conducted using PM Peak Hour volumes for both the existing and design year conditions to determine whether adjustments to existing lane configurations are warranted. Tables 20 and 21 present the operational analysis results for 2012 and 2036 respectively.

Movement	2012 PHV	v/c Ratio	Lane Group Delay	Lane Group LOS
Gwinnett Street				
Eastbound L/T/R	177	0.26	12.5 seconds	B
Westbound Left	126	0.26	12.8 seconds	B
Westbound Through	146	0.20	11.8 seconds	B
Westbound Right	90	0.14	11.4 seconds	B
Stiles Avenue				
Northbound L/T	55	0.08	9.6 seconds	A
Northbound Right	43	0.06	9.5 seconds	A
Southbound Left	145	0.40	20.7 seconds	C
Southbound T/R	91	0.19	17.2 seconds	B

Table 20 - Gwinnett at Stiles, Signalized Intersection Analysis Results for the 2012 PM Peak Hour

Movement	2036 PHV	v/c Ratio	Lane Group Delay	Lane Group LOS
Gwinnett Street				
Eastbound L/T/R	240	0.34	12.1 seconds	B
Westbound Left	167	0.35	12.8 seconds	B
Westbound Through	193	0.24	11.1 seconds	B
Westbound Right	138	0.21	10.8 seconds	B
Stiles Avenue				
Northbound L/T	74	0.13	11.2 seconds	B
Northbound Right	75	0.12	11.0 seconds	B
Southbound Left	193	0.61	28.5 seconds	C
Southbound T/R	125	0.30	20.0 seconds	B

Table 21 - Gwinnett at Stiles, Signalized Intersection Analysis Results for the 2036 PM Peak Hour

The intersection operates adequately in both existing and design year conditions with an overall level of service of B in both cases with total intersection delays of 13.8 and 15.2 seconds per vehicle, respectively. No changes to the existing lane configuration are warranted.

Determination of Minimum Turn Lane Queue Lengths

The Gwinnett Street westbound approach to the Stiles intersection currently includes a 90-foot left turn lane with a 75 foot taper, a single through lane and a flared right turn with a 50-foot taper, separated from the intersection by a raised concrete island and providing 100 feet of effective storage.

The 95th Percentile back of queue values were used as a general basis for the determination of minimum turn lane storage lengths. Georgia Department of Transportation guidelines stipulate that the minimum length of right and left hand turn bays for a road with a 35 mph design speed are 100 and 160 feet respectively. Minimum taper lengths for both are 50 feet. Where the calculated minimums (based on 25 feet per vehicle) are less than these, the GDOT minimums should be used. Table 22 presents 2036 95% back of queue values based on the operational analysis and recommendations for minimum turn lane lengths.

Movement	95% BOQ PM Peak	Calculated Minimum Storage	GDOT Policy Minimum Lengths	Recommended Minimum Lengths
Westbound Left	4.7 vehicles	125 feet	160’ storage / 50’ taper	160’ storage / 50’ taper
Westbound Right	3.7 vehicles	100 feet	100’ storage / 50’ taper	100’ storage / 50’ taper

Table 22 - Gwinnett at Stiles, 2036 Back of Queue and Minimum Turn Lane Lengths (Westbound Approach)

Conclusion and Recommendations

The existing two-lane Gwinnett Street study corridor between Stiles Avenue and West Boundary Street/I-16 operates adequately under both current and future traffic conditions. No increase in the number of through lanes will be necessary. Currently, the number of pedestrians and bicyclists using the corridor is significant enough to warrant the maintenance of sidewalks and the addition of sufficient pavement width to accommodate bicycles.

Based on the assumptions and analysis as described in this report, the following improvements are recommended:

1. Maintain sidewalks along the entire length of the study corridor between Stiles Avenue and West Boundary Street/I-16.

2. Provide pavement widths sufficient to accommodate bicycles, both eastbound and westbound between Stiles Avenue and West Boundary Street/I-16.

3. Provide an exclusive left turn lane on the westbound approach to the Stiles Avenue intersection with a minimum length of 160 feet with a minimum taper length of 50 feet.

4. Maintain or lengthen the existing 100 feet of effective storage capacity for right turns on the westbound approach to the Stiles Avenue intersection.

APPENDIX A

2012 Field Count Data

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/15/12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	0	119	42	4	13	3	0	2	0	0	0	0	0	5	188
10:00	1	120	54	3	16	3	0	1	1	0	0	0	0	6	205
11:00	0	126	51	2	14	10	0	5	2	0	0	0	0	6	216
12 PM	2	165	60	2	19	8	0	3	1	0	0	0	0	11	271
13:00	1	149	69	5	11	4	0	1	1	0	0	0	0	6	247
14:00	0	165	76	4	22	9	0	2	0	0	0	0	0	9	287
15:00	1	179	79	2	34	5	0	5	2	0	0	0	0	14	321
16:00	1	196	78	4	20	17	0	6	0	0	0	0	0	9	331
17:00	2	313	71	2	11	9	0	2	1	0	0	0	0	10	421
18:00	0	226	53	3	6	8	0	2	0	0	0	0	0	3	301
19:00	0	174	60	1	6	3	0	1	0	0	0	0	0	3	248
20:00	0	142	41	1	4	1	0	0	0	0	0	0	0	6	195
21:00	0	119	33	0	0	0	0	0	0	0	0	0	0	2	154
22:00	0	122	19	0	3	0	0	0	0	0	0	0	0	1	145
23:00	0	63	13	0	0	0	0	0	0	0	0	0	0	0	76
Total	8	2378	799	33	179	80	0	30	8	0	0	0	0	91	3606
Percent	0.2%	65.9%	22.2%	0.9%	5.0%	2.2%	0.0%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	2.5%	
AM Peak	10:00	11:00	10:00	09:00	10:00	11:00		11:00	11:00					10:00	
Vol.	1	126	54	4	16	10		5	2					6	
PM Peak	12:00	17:00	15:00	13:00	15:00	16:00		16:00	15:00					15:00	
Vol.	2	313	79	5	34	17		6	2					14	

JAMAR Technologies, Inc.

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800-776-0940

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Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/16/12	0	41	13	0	0	0	0	0	0	0	0	0	0	0	54
01:00	0	25	3	0	2	0	0	0	0	0	0	0	0	1	31
02:00	0	12	1	0	0	0	0	0	0	0	0	0	0	0	13
03:00	0	14	10	0	0	0	0	0	0	0	1	0	0	0	25
04:00	0	20	10	0	1	2	0	0	0	0	0	0	0	0	33
05:00	1	28	11	4	3	2	0	0	0	0	0	0	0	1	50
06:00	1	128	59	1	10	1	0	0	1	0	0	0	0	1	202
07:00	1	87	35	7	10	3	0	4	1	0	0	0	0	6	154
08:00	1	90	46	2	21	2	0	1	0	0	0	0	0	5	168
09:00	1	123	49	3	17	2	0	3	1	0	0	0	0	11	210
10:00	0	125	61	0	10	2	0	0	0	0	0	0	0	4	202
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	5	693	298	17	74	14	0	8	3	0	1	0	0	29	1142
Percent	0.4%	60.7%	26.1%	1.5%	6.5%	1.2%	0.0%	0.7%	0.3%	0.0%	0.1%	0.0%	0.0%	2.5%	
AM Peak	05:00	06:00	10:00	07:00	08:00	07:00		07:00	06:00		03:00			09:00	
Vol.	1	128	61	7	21	3		4	1		1			11	
PM Peak															
Vol.															
Grand Total	13	3071	1097	50	253	94	0	38	11	0	1	0	0	120	4748
Percent	0.3%	64.7%	23.1%	1.1%	5.3%	2.0%	0.0%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	2.5%	

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/15/12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	1	129	53	5	21	5	0	1	0	0	0	0	0	2	217
10:00	1	115	59	5	14	5	0	3	0	0	0	0	0	4	206
11:00	0	138	56	4	18	5	0	0	0	0	0	0	0	8	229
12 PM	0	137	67	1	20	3	0	3	0	0	0	0	0	12	243
13:00	1	147	65	3	18	5	0	2	0	0	0	0	0	6	247
14:00	1	124	55	3	13	2	0	1	1	0	0	0	0	7	207
15:00	2	197	84	4	28	3	0	2	0	0	0	0	0	14	334
16:00	1	184	68	4	20	0	0	0	0	0	0	0	0	13	290
17:00	2	251	94	2	20	2	0	1	0	0	0	0	0	15	387
18:00	1	144	55	2	5	3	0	1	0	0	0	0	0	7	218
19:00	0	158	46	1	5	4	0	0	0	0	0	0	0	8	222
20:00	0	124	42	2	5	3	0	0	0	0	0	0	0	5	181
21:00	0	102	29	1	3	0	0	0	0	0	0	0	0	3	138
22:00	0	84	33	1	3	1	0	0	0	0	0	0	0	1	123
23:00	0	38	4	0	1	0	0	0	0	0	0	0	0	0	43
Total	10	2072	810	38	194	41	0	14	1	0	0	0	0	105	3285
Percent	0.3%	63.1%	24.7%	1.2%	5.9%	1.2%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	
AM Peak	09:00	11:00	10:00	09:00	09:00	09:00		10:00						11:00	
Vol.	1	138	59	5	21	5		3						8	
PM Peak	15:00	17:00	17:00	15:00	15:00	13:00		12:00	14:00					17:00	
Vol.	2	251	94	4	28	5		3	1					15	

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

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btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/16/12	0	32	7	0	1	0	0	0	0	0	0	0	0	0	40
01:00	0	15	3	0	0	0	0	0	0	0	0	0	0	0	18
02:00	0	8	2	0	0	0	0	0	0	0	0	0	0	0	10
03:00	0	15	4	2	1	2	0	0	0	0	0	0	0	0	24
04:00	0	12	4	3	1	0	0	0	0	0	0	0	0	1	21
05:00	1	14	13	0	6	1	0	1	0	0	0	0	0	0	36
06:00	0	48	20	5	8	1	0	0	0	0	0	0	0	2	84
07:00	1	127	57	11	44	22	0	10	1	0	0	0	0	9	282
08:00	0	120	64	5	46	1	0	4	0	0	0	0	0	5	245
09:00	2	137	51	5	22	2	0	1	0	0	0	0	0	9	229
10:00	1	131	55	4	14	3	0	2	3	0	0	0	0	9	222
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	5	659	280	35	143	32	0	18	4	0	0	0	0	35	1211
Percent	0.4%	54.4%	23.1%	2.9%	11.8%	2.6%	0.0%	1.5%	0.3%	0.0%	0.0%	0.0%	0.0%	2.9%	
AM Peak	09:00	09:00	08:00	07:00	08:00	07:00		07:00	10:00					07:00	
Vol.	2	137	64	11	46	22		10	3					9	
PM Peak Vol.															
Grand Total	15	2731	1090	73	337	73	0	32	5	0	0	0	0	140	4496
Percent	0.3%	60.7%	24.2%	1.6%	7.5%	1.6%	0.0%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%	3.1%	

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
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btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB, EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/15/12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	1	248	95	9	34	8	0	3	0	0	0	0	0	7	405
10:00	2	235	113	8	30	8	0	4	1	0	0	0	0	10	411
11:00	0	264	107	6	32	15	0	5	2	0	0	0	0	14	445
12 PM	2	302	127	3	39	11	0	6	1	0	0	0	0	23	514
13:00	2	296	134	8	29	9	0	3	1	0	0	0	0	12	494
14:00	1	289	131	7	35	11	0	3	1	0	0	0	0	16	494
15:00	3	376	163	6	62	8	0	7	2	0	0	0	0	28	655
16:00	2	380	146	8	40	17	0	6	0	0	0	0	0	22	621
17:00	4	564	165	4	31	11	0	3	1	0	0	0	0	25	808
18:00	1	370	108	5	11	11	0	3	0	0	0	0	0	10	519
19:00	0	332	106	2	11	7	0	1	0	0	0	0	0	11	470
20:00	0	266	83	3	9	4	0	0	0	0	0	0	0	11	376
21:00	0	221	62	1	3	0	0	0	0	0	0	0	0	5	292
22:00	0	206	52	1	6	1	0	0	0	0	0	0	0	2	268
23:00	0	101	17	0	1	0	0	0	0	0	0	0	0	0	119
Total	18	4450	1609	71	373	121	0	44	9	0	0	0	0	196	6891
Percent	0.3%	64.6%	23.3%	1.0%	5.4%	1.8%	0.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	2.8%	
AM Peak	10:00	11:00	10:00	09:00	09:00	11:00		11:00	11:00					11:00	
Vol.	2	264	113	9	34	15		5	2					14	
PM Peak	17:00	17:00	17:00	13:00	15:00	16:00		15:00	15:00					15:00	
Vol.	4	564	165	8	62	17		7	2					28	

JAMAR Technologies, Inc.

151 Keith Valley Rd.
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800-776-0940

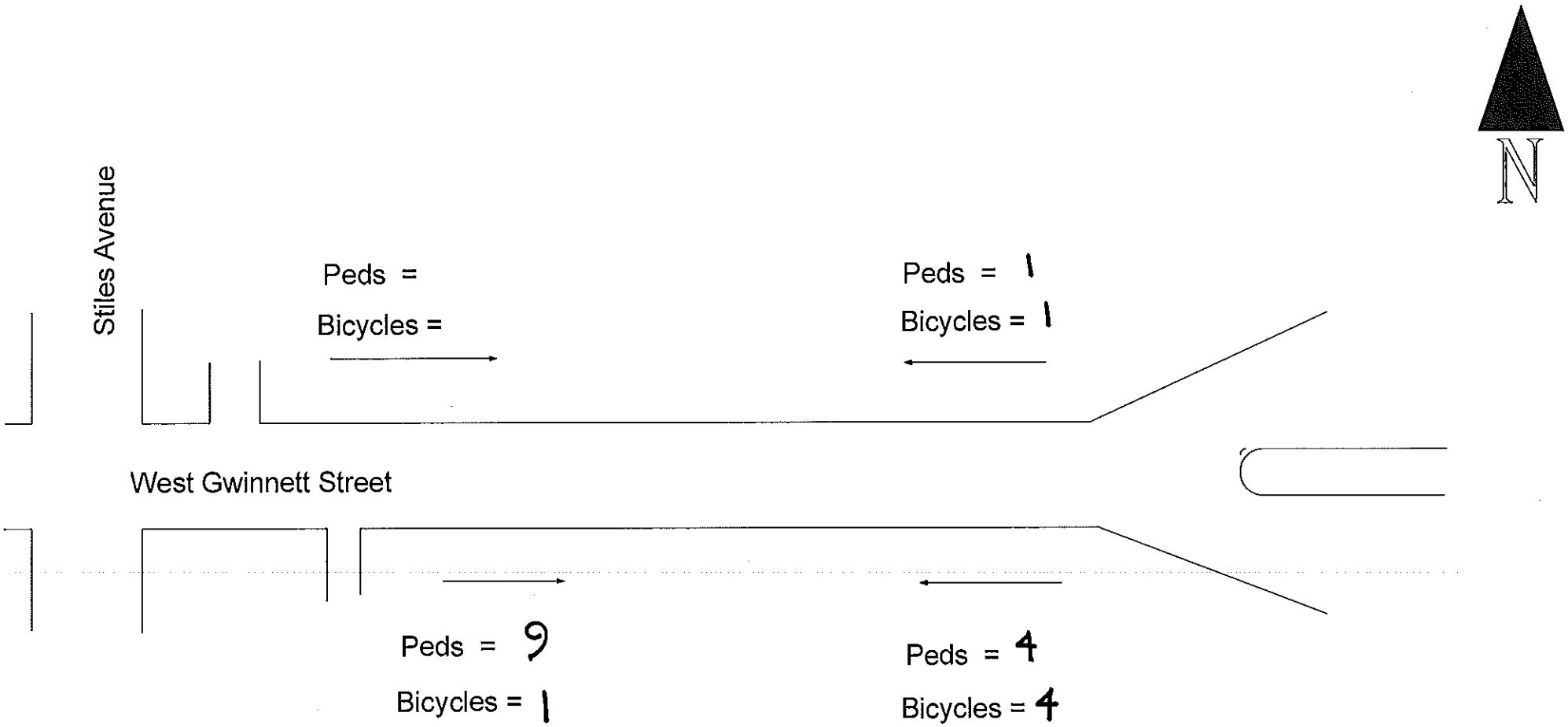
Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB, EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
8/16/12	0	73	20	0	1	0	0	0	0	0	0	0	0	0	94
01:00	0	40	6	0	2	0	0	0	0	0	0	0	0	1	49
02:00	0	20	3	0	0	0	0	0	0	0	0	0	0	0	23
03:00	0	29	14	2	1	2	0	0	0	0	1	0	0	0	49
04:00	0	32	14	3	2	2	0	0	0	0	0	0	0	1	54
05:00	2	42	24	4	9	3	0	1	0	0	0	0	0	1	86
06:00	1	176	79	6	18	2	0	0	1	0	0	0	0	3	286
07:00	2	214	92	18	54	25	0	14	2	0	0	0	0	15	436
08:00	1	210	110	7	67	3	0	5	0	0	0	0	0	10	413
09:00	3	260	100	8	39	4	0	4	1	0	0	0	0	20	439
10:00	1	256	116	4	24	5	0	2	3	0	0	0	0	13	424
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	10	1352	578	52	217	46	0	26	7	0	1	0	0	64	2353
Percent	0.4%	57.5%	24.6%	2.2%	9.2%	2.0%	0.0%	1.1%	0.3%	0.0%	0.0%	0.0%	0.0%	2.7%	
AM Peak	09:00	09:00	10:00	07:00	08:00	07:00		07:00	10:00		03:00			09:00	
Vol.	3	260	116	18	67	25		14	3		1			20	
PM Peak															
Vol.															
Grand Total	28	5802	2187	123	590	167	0	70	16	0	1	0	0	260	9244
Percent	0.3%	62.8%	23.7%	1.3%	6.4%	1.8%	0.0%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	2.8%	

Date: 8|16|12

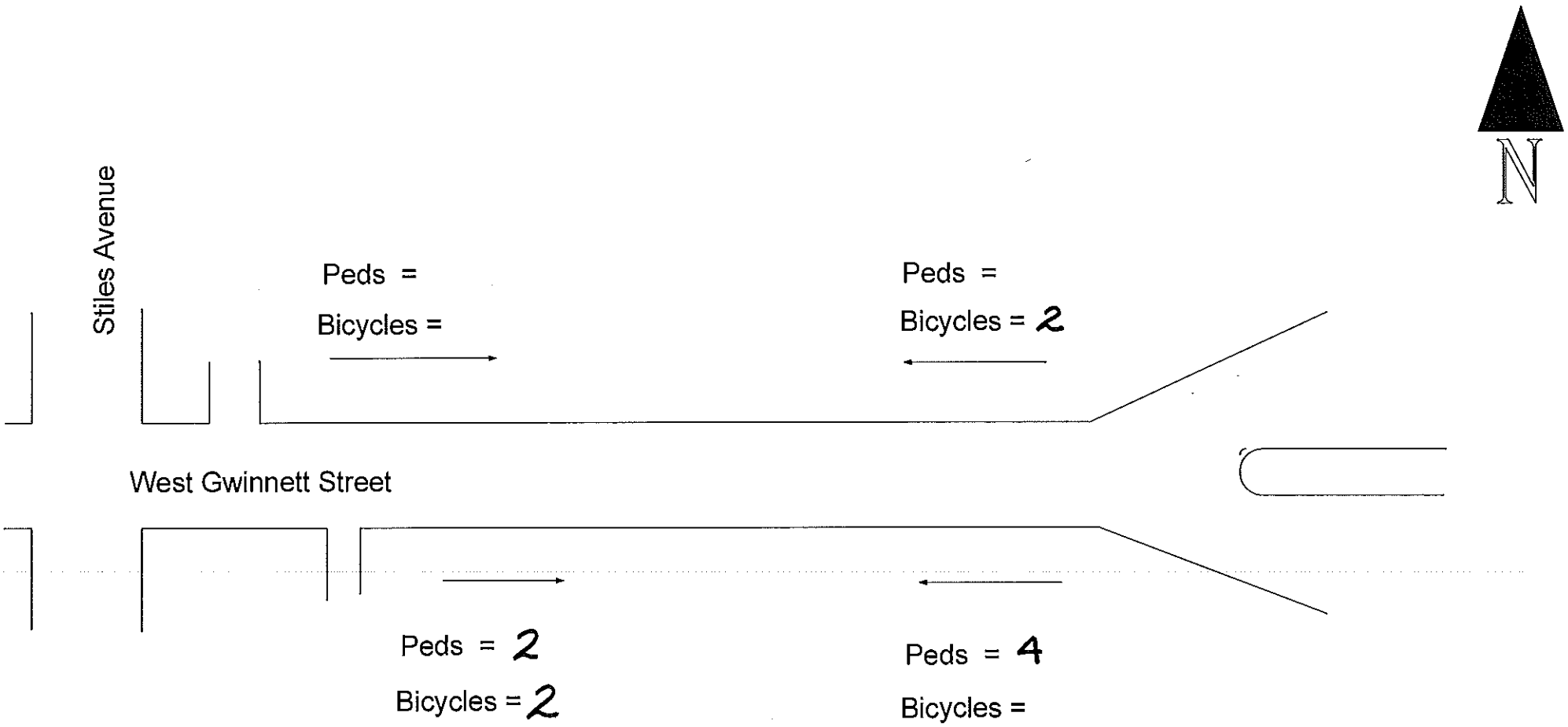
Times: 6^45 - 7^45 am



1in = 26.74ft --

Date: 8/15/12

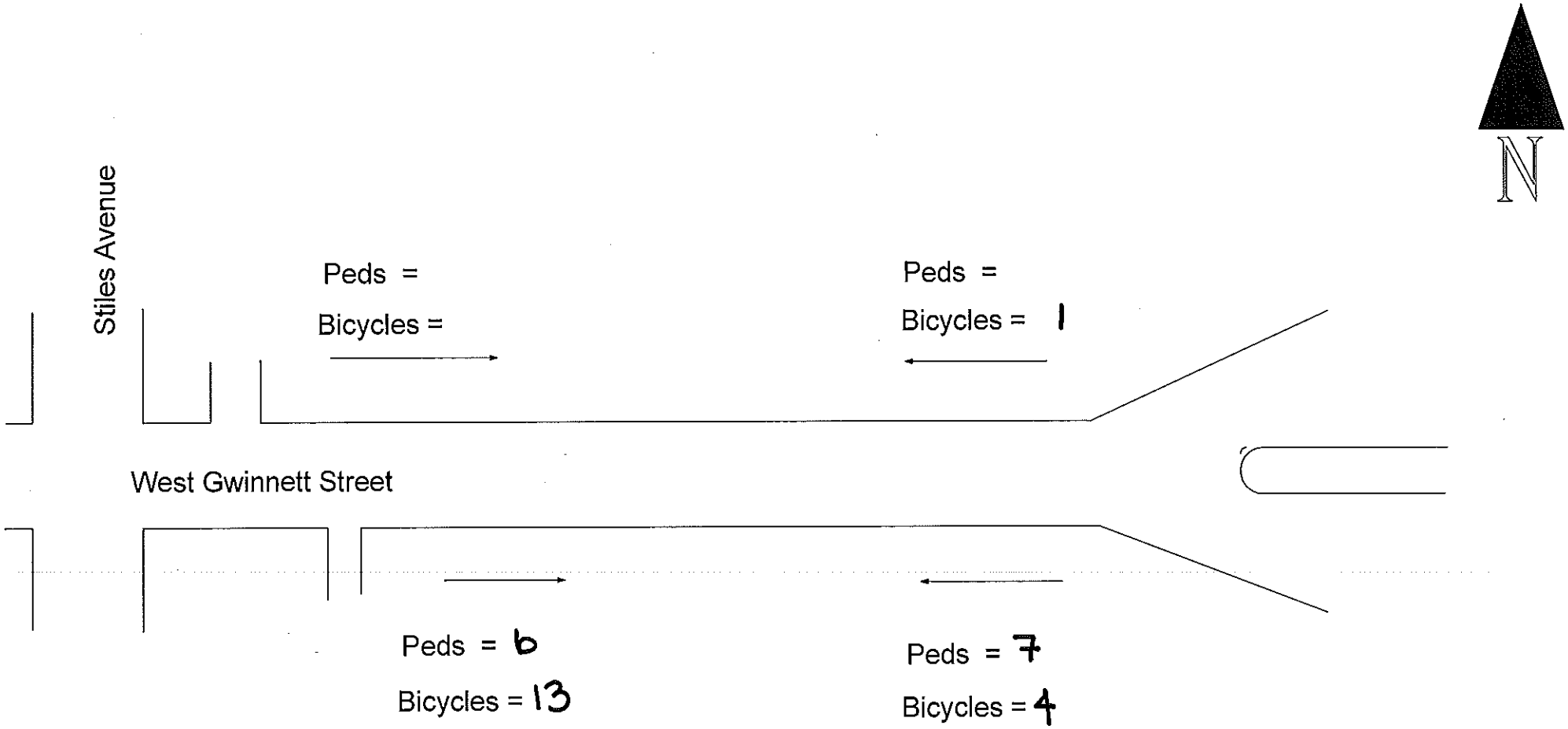
Times: 12-1 pm



1in = 26.74ft

Date: 8|15|12

Times: 3:15-5:15pm



1in = 26.74ft --

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/15/ 12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	5	0	0	0	0	0	0	1	3	4	2	16	24	17	42	33	22	10	4	1	4	0	0	0	0	0	0	0	0	0	188
10:00	6	0	0	0	0	0	1	1	5	1	5	8	21	33	33	29	25	15	10	6	3	2	1	0	0	0	0	0	0	0	205
11:00	6	0	0	0	1	2	0	0	3	5	6	19	29	41	40	28	19	9	3	4	0	0	0	0	1	0	0	0	0	0	216
12 PM	11	0	1	1	0	5	1	1	5	6	8	20	32	42	53	36	24	16	5	1	2	0	1	0	0	0	0	0	0	0	271
13:00	6	0	0	0	0	0	0	0	0	1	5	16	31	41	45	28	37	20	9	5	1	2	0	0	0	0	0	0	0	0	247
14:00	9	0	0	2	4	1	0	0	0	2	4	22	35	49	47	32	33	18	16	10	1	1	1	0	0	0	0	0	0	0	287
15:00	15	0	1	0	2	3	1	1	4	20	13	27	44	56	51	42	22	14	4	0	1	0	0	0	0	0	0	0	0	0	321
16:00	9	0	2	2	10	2	1	2	6	12	32	43	44	46	41	33	26	9	7	4	0	0	0	0	0	0	0	0	0	0	331
17:00	10	0	0	0	0	0	0	3	8	18	18	36	47	75	75	73	35	12	8	2	1	0	0	0	0	0	0	0	0	0	421
18:00	3	0	0	1	3	4	0	1	1	5	10	28	37	41	48	37	28	18	19	5	7	2	1	0	2	0	0	0	0	0	301
19:00	3	0	0	0	0	0	0	0	0	2	14	24	28	43	41	41	20	15	10	3	1	1	2	0	0	0	0	0	0	0	248
20:00	6	0	0	1	0	0	0	0	0	1	10	23	22	31	29	24	21	11	6	6	2	2	0	0	0	0	0	0	0	0	195
21:00	1	0	0	0	0	0	1	0	1	3	5	15	25	29	14	26	12	10	5	3	0	1	1	1	0	0	0	0	0	1	154
22:00	1	0	0	0	0	0	0	0	0	2	5	10	22	19	25	24	13	12	6	3	2	0	0	0	1	0	0	0	0	0	145
23:00	0	0	0	0	0	0	0	0	0	0	1	5	9	9	17	8	9	9	3	3	2	0	0	0	1	0	0	0	0	0	76
Total	91	0	4	7	20	17	5	10	36	82	138	312	450	572	601	494	346	198	115	56	27	11	7	1	5	0	0	0	0	1	3606

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/16/ 12	0	0	0	0	0	0	0	0	0	1	2	4	4	8	9	7	9	6	2	1	0	0	1	0	0	0	0	0	0	0	54
01:00	1	0	0	0	0	0	0	0	1	0	0	1	2	6	5	2	4	2	7	0	0	0	0	0	0	0	0	0	0	0	31
02:00	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	1	2	3	0	1	0	1	0	0	0	0	0	0	0	13
03:00	0	0	0	0	0	0	0	0	0	0	1	1	1	8	3	4	2	2	0	0	2	1	0	0	0	0	0	0	0	0	25
04:00	0	0	0	0	0	1	2	0	0	2	1	2	1	7	4	4	5	2	1	1	0	0	0	0	0	0	0	0	0	0	33
05:00	0	0	0	1	0	1	0	0	0	2	2	4	6	7	7	2	7	2	5	0	0	3	0	0	0	0	0	0	0	1	50
06:00	1	0	0	0	0	0	0	1	4	4	27	20	39	28	41	21	6	5	3	2	0	0	0	0	0	0	0	0	0	0	202
07:00	6	0	0	1	0	2	2	1	1	4	7	15	19	25	28	18	11	7	2	1	2	1	1	0	0	0	0	0	0	0	154
08:00	5	0	0	0	1	0	0	2	2	3	4	10	20	25	29	29	12	12	6	5	2	1	0	0	0	0	0	0	0	0	168
09:00	11	0	0	0	1	0	3	2	4	6	9	18	32	36	36	15	9	13	6	3	0	0	1	1	0	0	1	1	0	2	210
10:00	4	0	6	2	0	1	0	1	0	4	4	18	22	29	35	24	27	14	6	4	0	1	0	0	0	0	0	0	0	0	202
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	28	0	6	4	2	5	7	7	12	26	57	93	148	160	198	127	93	67	41	17	7	7	4	1	0	0	1	1	0	3	1142
Gr. Total	119	0	10	11	22	22	12	17	48	108	195	405	598	752	799	621	439	265	156	73	34	18	11	2	5	0	1	1	0	4	4748

Stats

15th Percentile :	31 MPH
50th Percentile :	37 MPH
85th Percentile :	42 MPH
95th Percentile :	45 MPH
Mean Speed(Average) :	36 MPH
Number of Vehicles > 35 MPH :	2805
Percent of Vehicles > 35 MPH :	59.1%

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

EB

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/15/ 12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	2	0	0	0	0	0	1	0	0	1	6	12	22	30	42	34	26	11	15	9	4	0	2	0	0	0	0	0	0	0	217
10:00	4	0	0	0	0	2	0	1	2	3	7	7	26	38	20	40	25	18	7	5	1	0	0	0	0	0	0	0	0	0	206
11:00	8	0	0	0	0	1	0	2	3	7	7	25	24	40	43	27	18	9	5	5	5	0	0	0	0	0	0	0	0	0	229
12 PM	12	1	0	0	0	1	0	0	2	6	12	27	34	43	33	20	20	14	12	4	1	0	1	0	0	0	0	0	0	0	243
13:00	6	0	0	0	6	1	1	0	1	2	7	14	23	27	38	46	28	21	13	6	5	2	0	0	0	0	0	0	0	0	247
14:00	7	0	0	0	0	0	0	0	0	2	2	20	15	33	29	27	26	19	13	8	2	4	0	0	0	0	0	0	0	0	207
15:00	14	0	0	0	1	4	9	1	2	7	24	26	40	47	58	47	27	13	7	4	2	1	0	0	0	0	0	0	0	0	334
16:00	13	0	0	0	0	0	0	0	2	4	11	33	48	29	50	30	29	18	12	5	2	1	1	0	1	0	0	1	0	0	290
17:00	15	0	0	0	0	0	0	1	2	8	29	38	49	68	63	46	27	25	12	2	1	0	1	0	0	0	0	0	0	0	387
18:00	7	0	0	0	0	0	0	0	2	3	7	9	19	30	38	41	27	7	11	11	3	3	0	0	0	0	0	0	0	0	218
19:00	8	0	0	0	0	0	0	0	0	4	10	18	27	32	33	31	29	14	8	3	3	0	1	1	0	0	0	0	0	0	222
20:00	5	0	1	0	0	3	0	0	3	0	6	14	27	34	23	32	16	9	4	2	2	0	0	0	0	0	0	0	0	0	181
21:00	3	0	0	0	0	1	0	0	0	4	5	18	19	16	24	16	17	11	2	1	0	0	1	0	0	0	0	0	0	0	138
22:00	1	0	0	0	0	1	0	0	4	3	5	12	13	28	20	17	4	7	2	3	1	1	0	0	0	1	0	0	0	0	123
23:00	0	0	0	0	0	0	0	0	0	4	2	4	6	11	8	4	2	0	0	2	0	0	0	0	0	0	0	0	0	0	43
Total	105	1	1	0	7	14	11	5	23	58	140	277	392	506	522	458	321	196	123	70	32	12	7	1	1	1	0	1	0	0	3285

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

E8

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/16/ 12	0	0	0	0	0	0	1	1	0	0	3	10	5	6	7	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	40
01:00	0	0	0	0	0	0	0	0	0	0	1	3	2	2	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	18
02:00	0	0	0	0	0	0	0	0	1	0	0	1	2	0	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	10
03:00	0	0	0	0	0	0	0	0	0	0	2	2	2	2	4	2	5	1	1	2	1	0	0	0	0	0	0	0	0	0	24
04:00	1	0	0	0	0	0	0	0	0	2	1	1	2	5	3	1	3	0	1	1	0	0	0	0	0	0	0	0	0	0	21
05:00	0	0	0	0	0	0	0	0	1	0	1	6	3	5	5	4	7	0	3	0	1	0	0	0	0	0	0	0	0	0	36
06:00	2	0	0	0	0	0	0	0	2	3	1	12	11	12	15	10	5	4	2	1	2	0	2	0	0	0	0	0	0	0	84
07:00	9	0	1	2	9	7	8	6	9	21	37	36	35	36	24	15	16	6	3	0	1	1	0	0	0	0	0	0	0	0	282
08:00	5	0	0	0	2	4	1	1	4	6	8	19	34	36	45	31	23	12	6	4	2	1	1	0	0	0	0	0	0	0	245
09:00	9	0	0	0	0	0	5	7	2	10	8	20	24	28	34	32	17	18	6	3	1	3	0	0	1	0	0	0	0	1	229
10:00	9	0	0	0	0	1	0	1	7	5	13	12	30	35	42	31	13	12	5	3	2	1	0	0	0	0	0	0	0	0	222
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	35	0	1	2	11	12	15	16	26	47	75	122	150	167	184	132	94	57	29	15	10	6	3	0	1	0	0	0	0	1	1211
Gr. Total	140	1	2	2	18	26	26	21	49	105	215	399	542	673	706	590	415	253	152	85	42	18	10	1	2	1	0	1	0	1	4496

Stats

15th Percentile :	31 MPH
50th Percentile :	37 MPH
85th Percentile :	42 MPH
95th Percentile :	46 MPH
Mean Speed(Average) :	36 MPH
Number of Vehicles > 35 MPH :	2614
Percent of Vehicles > 35 MPH :	58.1%

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID: .
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB, EB

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/15/ 12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	7	0	0	0	0	0	1	1	3	5	8	28	46	47	84	67	48	21	19	10	6	0	2	0	0	0	0	0	0	0	405
10:00	10	0	0	0	0	2	1	2	7	4	12	15	47	71	53	69	50	33	17	11	4	2	1	0	0	0	0	0	0	0	411
11:00	14	0	0	0	1	3	0	2	6	12	13	44	53	81	83	55	37	18	8	9	5	0	0	0	1	0	0	0	0	0	445
12 PM	23	1	1	1	0	6	1	1	7	12	20	47	66	85	86	56	44	30	17	5	3	0	2	0	0	0	0	0	0	0	514
13:00	12	0	0	0	6	1	1	0	1	3	12	30	54	68	83	74	65	41	22	11	6	4	0	0	0	0	0	0	0	0	494
14:00	16	0	0	2	4	1	0	0	0	4	6	42	50	82	76	59	59	37	29	18	3	5	1	0	0	0	0	0	0	0	494
15:00	29	0	1	0	3	7	10	2	6	27	37	53	84	103	109	89	49	27	11	4	3	1	0	0	0	0	0	0	0	0	655
16:00	22	0	2	2	10	2	1	2	8	16	43	76	92	75	91	63	55	27	19	9	2	1	1	0	1	0	0	1	0	0	621
17:00	25	0	0	0	0	0	0	4	10	26	47	74	96	143	138	119	62	37	20	4	2	0	1	0	0	0	0	0	0	0	808
18:00	10	0	0	1	3	4	0	1	3	8	17	37	56	71	86	78	55	25	30	16	10	5	1	0	2	0	0	0	0	0	519
19:00	11	0	0	0	0	0	0	0	0	6	24	42	55	75	74	72	49	29	18	6	4	1	3	1	0	0	0	0	0	0	470
20:00	11	0	1	1	0	3	0	0	3	1	16	37	49	65	52	56	37	20	10	8	4	2	0	0	0	0	0	0	0	0	376
21:00	4	0	0	0	0	1	1	0	1	7	10	33	44	45	38	42	29	21	7	4	0	1	2	1	0	0	0	0	0	1	292
22:00	2	0	0	0	0	1	0	0	4	5	10	22	35	47	45	41	17	19	8	6	3	1	0	0	1	1	0	0	0	0	268
23:00	0	0	0	0	0	0	0	0	0	4	3	9	15	20	25	12	11	9	3	5	2	0	0	0	1	0	0	0	0	0	119
Total	196	1	5	7	27	31	16	15	59	140	278	589	842	1078	1123	952	667	394	238	126	59	23	14	2	6	1	0	1	0	1	6891

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Gwinn
Station ID:
Gwinnett St
btwn I-16&Stiles
Latitude: 0' 0.000 Undefined

WB, EB

Start Time	10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40	41 42	43 44	45 46	47 48	49 50	51 52	53 54	55 56	57 58	59 60	61 62	63 64	65 66	67 999	Total
8/16/																															
12	0	0	0	0	0	0	1	1	0	1	5	14	9	14	16	9	11	8	3	1	0	0	1	0	0	0	0	0	0	0	94
01:00	1	0	0	0	0	0	0	0	1	0	1	4	4	8	9	5	5	4	7	0	0	0	0	0	0	0	0	0	0	0	49
02:00	0	0	0	0	0	0	0	0	1	0	0	1	4	1	2	2	3	2	4	1	1	0	1	0	0	0	0	0	0	0	23
03:00	0	0	0	0	0	0	0	0	0	0	3	3	3	10	7	6	7	3	1	2	3	1	0	0	0	0	0	0	0	0	49
04:00	1	0	0	0	0	1	2	0	0	4	2	3	3	12	7	5	6	2	2	2	0	0	0	0	0	0	0	0	0	0	54
05:00	0	0	0	1	0	1	0	0	1	2	3	10	9	12	12	6	14	2	8	0	1	3	0	0	0	0	0	0	0	1	86
06:00	3	0	0	0	0	0	0	1	6	7	28	32	50	40	56	31	11	9	5	3	2	0	2	0	0	0	0	0	0	0	286
07:00	15	0	1	3	9	9	10	7	10	25	44	51	54	61	52	33	27	13	5	1	3	2	1	0	0	0	0	0	0	0	436
08:00	10	0	0	0	3	4	1	3	6	9	12	29	54	61	74	60	35	24	12	9	4	2	1	0	0	0	0	0	0	0	413
09:00	20	0	0	0	1	0	8	9	6	16	17	38	56	64	70	47	26	31	12	6	1	3	1	1	1	0	1	1	0	3	439
10:00	13	0	6	2	0	2	0	2	7	9	17	30	52	64	77	55	40	28	11	7	2	2	0	0	0	0	0	0	0	0	424
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	63	0	7	6	13	17	22	23	38	73	132	215	298	347	382	259	187	124	70	32	17	13	7	1	1	0	1	1	0	4	2353
Gr. Total	259	1	12	13	40	48	38	38	97	213	410	804	1140	1425	1505	1211	854	518	308	158	76	36	21	3	7	1	1	2	0	5	9244

Stats

15th Percentile :	31 MPH
50th Percentile :	37 MPH
85th Percentile :	42 MPH
95th Percentile :	46 MPH
Mean Speed(Average) :	36 MPH
Number of Vehicles > 35 MPH :	5419
Percent of Vehicles > 35 MPH :	58.6%

JAMAR Technologies, Inc.

151 Keith Valley Rd.
Horsham, PA, USA 19044
800-776-0940

Site Code: Stiles
Station ID:
Stiles
btwn Cornwall&Gwinnett
Latitude: 0' 0.000 Undefined

Start	20-Aug-12		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
Time	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
12:00 AM	*	*	16	24	*	*	*	*	*	*	*	*	*	*	16	24
01:00	*	*	11	13	*	*	*	*	*	*	*	*	*	*	11	13
02:00	*	*	14	9	*	*	*	*	*	*	*	*	*	*	14	9
03:00	*	*	5	10	*	*	*	*	*	*	*	*	*	*	5	10
04:00	*	*	7	11	*	*	*	*	*	*	*	*	*	*	7	11
05:00	*	*	26	54	*	*	*	*	*	*	*	*	*	*	26	54
06:00	*	*	80	93	*	*	*	*	*	*	*	*	*	*	80	93
07:00	*	*	**140**	**150**	*	*	*	*	*	*	*	*	*	*	**140**	**150**
08:00	*	*	125	120	*	*	*	*	*	*	*	*	*	*	125	120
09:00	*	*	128	96	*	*	*	*	*	*	*	*	*	*	128	96
10:00	*	*	111	110	*	*	*	*	*	*	*	*	*	*	111	110
11:00	*	*	129	102	*	*	*	*	*	*	*	*	*	*	129	102
12:00 PM	165	130	**145**	**135**	*	*	*	*	*	*	*	*	*	*	155	132
01:00	187	130	*	*	*	*	*	*	*	*	*	*	*	*	187	130
02:00	153	140	*	*	*	*	*	*	*	*	*	*	*	*	153	140
03:00	162	135	*	*	*	*	*	*	*	*	*	*	*	*	162	135
04:00	218	165	*	*	*	*	*	*	*	*	*	*	*	*	218	165
05:00	**233**	**211**	*	*	*	*	*	*	*	*	*	*	*	*	**233**	**211**
06:00	154	124	*	*	*	*	*	*	*	*	*	*	*	*	154	124
07:00	121	97	*	*	*	*	*	*	*	*	*	*	*	*	121	97
08:00	84	71	*	*	*	*	*	*	*	*	*	*	*	*	84	71
09:00	80	87	*	*	*	*	*	*	*	*	*	*	*	*	80	87
10:00	37	61	*	*	*	*	*	*	*	*	*	*	*	*	37	61
11:00	36	49	*	*	*	*	*	*	*	*	*	*	*	*	36	49
Lane	1630	1400	937	927	0	0	0	0	0	0	0	0	0	0	2412	2194
Day	3030		1864		0		0		0		0		0		4606	
AM Peak			07:00	07:00											07:00	07:00
Vol.			140	150											140	150
PM Peak	17:00	17:00	12:00	12:00											17:00	17:00
Vol.	233	211	145	135											233	211

Comb. Total	3030	1864	0	0	0	0	0	4606

ADT Not Calculated

APPENDIX B

HCM Analyses

Appendix B
HCM Analyses

HCS+: Signalized Intersections Release 5.4

Analyst: Jeff Netzinger
Agency: HGBD
Date: 10/18/2012
Period: PM Peak Hour
Project ID: Gwinnett Street Improvements, Stiles to West Boundary
E/W St: Gwinnett Street

Inter.: Gwinnett & Stiles
Area Type: All other areas
Jurisd: City of Savannah
Year : **2012**
N/S St: Stiles Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	1	1	1	0	1	1	1	1	0
LGConfig		LTR		L	T	R		LT	R	L	TR	
Volume	39	120	15	116	134	133	18	32	100	133	57	37
Lane Width		12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vol			10			50			60			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	P				NB Left	P	P		
Thru	P				Thru	P	P		
Right	P				Right	P	P		
Peds					Peds				
WB Left	P				SB Left		P		
Thru	P				Thru		P		
Right	P				Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	24.9					6.1	17.0		
Yellow	3.0					3.0	3.0		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	670	1614	0.26	0.41	12.5	B	12.5	B
Westbound								
L	488	1176	0.26	0.41	12.8	B		
T	732	1765	0.20	0.41	11.8	B	12.0	B
R	622	1500	0.14	0.41	11.4	B		
Northbound								
LT	677	1733	0.08	0.45	9.6	A	9.5	A
R	678	1500	0.06	0.45	9.5	A		
Southbound								
L	361	1273	0.40	0.28	20.7	C		
TR	476	1680	0.19	0.28	17.2	B	19.3	B

Intersection Delay = 13.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Courtney Lane

Appendix B
HCM Analyses

Hussey, Gay, Bell and DeYoung

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: Jeff Netzinger
Agency/Co.: HGBD
Date Performed: 10/18/2012
Analysis Time Period: PM Peak Hour
Intersection: Gwinnett & Stiles
Area Type: All other areas
Jurisdiction: City of Savannah
Analysis Year: 2012
Project ID: Gwinnett Street Improvements, Stiles to West Boundary
E/W St: Gwinnett Street N/S St: Stiles Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	39	120	15	116	134	133	18	32	100	133	57	37
% Heavy Veh	2	2	0	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PK 15 Vol	11	33	4	32	36	36	5	9	27	36	15	10
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1800		1800	1800	1800		1800	1800	1800	1800	
ParkExist												
NumPark												
No. Lanes	0	1	0	1	1	1	0	1	1	1	1	0
LGConfig		LTR		L	T	R		LT	R	L	TR	
Lane Width		12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vol			10			50			60			10
Adj Flow		177		126	146	90		55	43	145	91	
%InSharedLn												
Prop LTs		0.237		1.000	0.000			0.364		1.000	0.000	
Prop RTs	0.028			0.000		1.000	0.000		1.000	0.319		
Peds Bikes	0			0			0			0		
Buses		0		0	0	0		0	0	0	0	
%InProtPhase							0.0					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Arriv. Type		3		3	3	3		3	3	3	3	
Unit Ext.		3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Ext of g		2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P	P	

Appendix B
HCM Analyses

```
    Thru          P                    |     Thru   P     P
    Right         P                    |     Right  P     P
    Peds                               |     Peds

WB  Left          P                    | SB  Left         P
    Thru          P                    |     Thru         P
    Right         P                    |     Right        P
    Peds                               |     Peds

NB  Right                              | EB  Right
                                       |
SB  Right                              | WB  Right
                                       |
                                       |
Green            24.9                            6.1   17.0
Yellow           3.0                             3.0   3.0
All Red          1.0                             1.0   1.0

                                                  Cycle Length: 60.0    secs

_________________VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET_______________
Volume Adjustment
            |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
            | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
            |_______________|_______________|_______________|_______________|
Volume, V   |39   120  15    |116  134  133   |18   32   100   |133  57   37    |
PHF         |0.92 0.92 0.92  |0.92 0.92 0.92  |0.92 0.92 0.92  |0.92 0.92 0.92  |
Adj flow    |42   130  5     |126  146  90    |20   35   43    |145  62   29    |
No. Lanes   |   0   1   0    |   1   1   1    |   0   1   1    |   1   1   0    |
Lane group  |       LTR      | L     T    R   |       LT   R   | L     TR       |
Adj flow    |      177       |126  146  90    |      55   43   |145  91         |
Prop LTs    |       0.237    |1.000 0.000     |       0.364    |1.000 0.000     |
Prop RTs    |   0.028        |   0.000 1.000  |   0.000 1.000  |   0.319        |

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____
         Eastbound         Westbound        Northbound        Southbound
LG           LTR         L     T    R            LT   R      L     TR
So          1800        1800  1800  1800        1800  1800  1800  1800
Lanes 0     1     0     1     1     1     0     1     1     1     1     0
fW          1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fHV         0.981       0.980 0.980 0.980       0.980 0.980 0.980 0.980
fG          1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fP          1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fBB         1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fA          1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fLU         1.000       1.000 1.000 1.000       1.000 1.000 1.000 1.000
fRT         0.996             1.000 0.850       1.000 0.850       0.952
fLT         0.918       0.666 1.000             0.982       0.721 1.000
Sec.                                            0.811
fLpb        1.000       1.000 1.000             1.000       1.000 1.000
fRpb        1.000             1.000 1.000       1.000 1.000       1.000
S           1614        1176  1765  1500        1733  1500  1273  1680
Sec.                                            1432
_________________________CAPACITY AND LOS WORKSHEET_____________________________
Capacity Analysis and Lane Group Capacity
                      Adj      Adj Sat   Flow     Green  --Lane Group--
   Appr/  Lane     Flow Rate  Flow Rate  Ratio    Ratio  Capacity   v/c
   Mvmt   Group       (v)        (s)     (v/s)    (g/C)     (c)    Ratio
_____________________________________________________________________________
Eastbound
   Prot
   Perm
   Left
   Prot
```

Perm								
Thru	LTR	177	1614	#	0.11	0.41	670	0.26
Right								
Westbound								
Prot								
Perm								
Left	L	126	1176		0.11	0.41	488	0.26
Prot								
Perm								
Thru	T	146	1765		0.08	0.41	732	0.20
Right	R	90	1500		0.06	0.41	622	0.14
Northbound								
Prot								
Perm								
Left								
Prot		55	1733	#	0.03	0.102	176	0.31
Perm		0	1432		0.00	0.350	501	0.00
Thru	LT	55				0.45	677	0.08
Right	R	43	1500		0.03	0.45	678	0.06
Southbound								
Prot								
Perm								
Left	L	145	1273	#	0.11	0.28	361	0.40
Prot								
Perm								
Thru	TR	91	1680		0.05	0.28	476	0.19
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.26
Total lost time per cycle, L = 12.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.32

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	0.26	0.41	11.5	1.000	670	0.50	1.0	0.0	12.5	B	12.5	B
Westbound												
L	0.26	0.41	11.5	1.000	488	0.50	1.3	0.0	12.8	B		
T	0.20	0.41	11.2	1.000	732	0.50	0.6	0.0	11.8	B	12.0	B
R	0.14	0.41	10.9	1.000	622	0.50	0.5	0.0	11.4	B		
Northbound												
LT	0.08	0.45	9.4	1.000	677	0.50	0.2	0.0	9.6	A	9.5	A
R	0.06	0.45	9.3	1.000	678	0.50	0.2	0.0	9.5	A		
Southbound												
L	0.40	0.28	17.4	1.000	361	0.50	3.3	0.0	20.7	C		
TR	0.19	0.28	16.3	1.000	476	0.50	0.9	0.0	17.2	B	19.3	B

Intersection delay = 13.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			

Appendix B
HCM Analyses

Total actual green time for LT lane group, G (s)			24.9	17.0
Effective permitted green time for LT lane group, g(s)			24.9	17.0
Opposing effective green time, go (s)			24.9	27.1
Number of lanes in LT lane group, N			1	1
Number of lanes in opposing approach, No			1	1
Adjusted LT flow rate, VLT (veh/h)			126	145
Proportion of LT in LT lane group, PLT			1.000	1.000
Proportion of LT in opposing flow, PLTo			0.24	0.36
Adjusted opposing flow rate, Vo (veh/h)			177	55
Lost time for LT lane group, tL			4.00	4.00
Computation				
LT volume per cycle, LTC=VLTC/3600			2.10	2.42
Opposing lane util. factor, fLUo	1.000	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)			2.95	0.92
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g			0.0	0.0
Opposing platoon ratio, Rpo (refer Exhibit 16-11)			1.00	1.00
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]			0.58	0.55
gq, (see Exhibit C16-4,5,6,7,8)			2.38	0.00
gu=g-gq if gq>=gf, or = g-gf if gq<gf			22.52	17.00
n=Max(gq-gf)/2,0)			1.19	0.00
PTHo=1-PLTo			0.76	0.64
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]			1.00	1.00
EL1 (refer to Exhibit C16-3)			1.55	1.39
EL2=Max((1-Ptho**n)/Plto, 1.0)			1.16	1.00
fmin=2(1+PL)/g or fmin=2(1+Pl)/g			0.16	0.24
gdiff=max(gq-gf,0)			2.38	0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)			0.67	0.72
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT			0.666	0.721

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)	24.9		27.1	
Effective permitted green time for LT lane group, g(s)	24.9		21.0	
Opposing effective green time, go (s)	24.9		17.0	
Number of lanes in LT lane group, N	1		1	
Number of lanes in opposing approach, No	1		1	
Adjusted LT flow rate, VLT (veh/h)	42		20	
Proportion of LT in LT lane group, PLT	0.237	0.000	0.364	0.000
Proportion of LT in opposing flow, PLTo	0.00		0.00	
Adjusted opposing flow rate, Vo (veh/h)	146		91	
Lost time for LT lane group, tL	4.00		4.00	
Computation				
LT volume per cycle, LTC=VLTC/3600	0.70		0.33	
Opposing lane util. factor, fLUo	1.000	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	2.43		1.52	
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	8.6		1.3	
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		1.00	
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.58		0.72	
gq, (see Exhibit C16-4,5,6,7,8)	1.51		2.29	
gu=g-gq if gq>=gf, or = g-gf if gq<gf	16.32		18.71	

n=Max(gq-gf)/2,0)	0.00	0.50
PTHo=1-PLTo	1.00	1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]	0.24	0.36
EL1 (refer to Exhibit C16-3)	1.61	1.52
EL2=Max((1-Ptho**n)/Plto, 1.0)		
fmin=2(1+PL)/g or fmin=2(1+Pl)/g	0.10	0.13
gdiff=max(gq-gf,0)	0.00	0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)	0.92	0.81
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**		
Left-turn adjustment, fLT	0.918	0.811

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				

Appendix B

HCM Analyses

Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LTR	0.0	0.00	17.6	11.5	0.00	0.0	0.0	12.5
	0.0						0.0	
Westbound								
L	0.0	0.00	17.6	11.5	0.00	0.0	0.0	12.8
T	0.0	0.00	17.6	11.2	0.00	0.0	0.0	11.8
R	0.0	0.00	17.6	10.9	0.00	0.0	0.0	11.4
Northbound								
	0.0						0.0	
LT	0.0	0.00	16.5	9.4	0.00	0.0	0.0	9.6
R	0.0	0.00	16.4	9.3	0.00	0.0	0.0	9.5
Southbound								
L	0.0	0.00	21.5	17.4	0.00	0.0	0.0	20.7
TR	0.0	0.00	21.5	16.3	0.00	0.0	0.0	17.2
	0.0						0.0	

Intersection Delay 13.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup		LTR		L	T	R		LT	R	L	TR	
Init Queue		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Flow Rate		177		126	146	90		55	43	145	91	
So		1800		1800	1800	1800		1800	1800	1800	1800	
No.Lanes	0	1	0	1	1	1	0	1	1	1	1	0
SL		1614		1176	1765	1500		1499	1500	1273	1680	
LnCapacity		670		488	732	622		677	678	361	476	
Flow Ratio		0.1		0.1	0.1	0.1		0.0	0.0	0.1	0.1	
v/c Ratio		0.26		0.26	0.20	0.14		0.08	0.06	0.40	0.19	
Grn Ratio		0.41		0.41	0.41	0.41		0.45	0.45	0.28	0.28	
I Factor		1.000			1.000			1.000			1.000	
AT or PVG		3		3	3	3		3	3	3	3	
Pltn Ratio		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
PF2		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Q1		1.9		1.4	1.6	0.9		0.5	0.4	2.0	1.1	
kB		0.6		0.5	0.7	0.6		0.7	0.7	0.4	0.5	
Q2		0.2		0.2	0.2	0.1		0.1	0.0	0.3	0.1	
Q Average		2.2		1.6	1.7	1.0		0.6	0.4	2.2	1.3	
Q Spacing		25.0		25.0	25.0	25.0		25.0	25.0	25.0	25.0	
Q Storage		500		100	500	100		400	100	100	500	

Appendix B
HCM Analyses

Q S Ratio	0.1	0.4	0.1	0.3	0.0	0.1	0.6	0.1	
70th Percentile Output:									
fB%	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
BOQ	2.7	2.0	2.2	1.3	0.7	0.6	2.8	1.6	
QSRatio	0.1	0.5	0.1	0.3	0.0	0.1	0.7	0.1	
85th Percentile Output:									
fB%	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.6	
BOQ	3.5	2.5	2.8	1.7	0.9	0.8	3.6	2.1	
QSRatio	0.2	0.6	0.1	0.4	0.1	0.2	0.9	0.1	
90th Percentile Output:									
fB%	1.8	1.9	1.9	1.9	1.9	2.0	1.8	1.9	
BOQ	4.0	2.9	3.2	2.0	1.1	0.9	4.1	2.4	
QSRatio	0.2	0.7	0.2	0.5	0.1	0.2	1.0	0.1	
95th Percentile Output:									
fB%	2.2	2.3	2.3	2.4	2.5	2.5	2.2	2.4	
BOQ	4.9	**3.6**	**4.0**	**2.5**	1.4	1.1	5.0	3.0	
QSRatio	0.2	0.9	0.2	0.6	0.1	0.3	1.3	0.2	
98th Percentile Output:									
fB%	2.7	2.8	2.8	2.9	3.0	3.1	2.7	2.9	
BOQ	5.8	4.4	4.8	3.0	1.7	1.4	5.9	3.6	
QSRatio	0.3	1.1	0.2	0.8	0.1	0.3	1.5	0.2	

ERROR MESSAGES

No errors to report.

Appendix B
HCM Analyses

HCS+: Signalized Intersections Release 5.4

Analyst: Jeff Netzinger
Agency: HGBD
Date: 10/18/2012
Period: PM Peak Hour
Project ID: Gwinnett Street Improvements, Stiles to West Boundary
E/W St: Gwinnett Street

Inter.: Gwinnett & Stiles
Area Type: All other areas
Jurisd: City of Savannah
Year : **2036**
N/S St: Stiles Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	1	1	1	0	1	1	1	1	0
LGConfig		LTR		L	T	R		LT	R	L	TR	
Volume	51	160	20	154	178	177	23	45	129	178	75	50
Lane Width		12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vol			10			50			60			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	P				NB Left	P	P		
Thru	P				Thru	P	P		
Right	P				Right	P	P		
Peds					Peds				
WB Left	P				SB Left		P		
Thru	P				Thru		P		
Right	P				Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	26.8					6.1	15.1		
Yellow	3.0					3.0	3.0		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	708	1585	0.34	0.45	12.1	B	12.1	B
Westbound								
L	481	1077	0.35	0.45	12.8	B		
T	788	1765	0.24	0.45	11.1	B	11.6	B
R	670	1500	0.21	0.45	10.8	B		
Northbound								
LT	564	1735	0.13	0.42	11.2	B	11.1	B
R	630	1500	0.12	0.42	11.0	B		
Southbound								
L	315	1251	0.61	0.25	28.5	C		
TR	421	1674	0.30	0.25	20.0-	B	25.1	C

Intersection Delay = 15.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Courtney Lane

Appendix B
HCM Analyses

Hussey, Gay, Bell and DeYoung

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: Jeff Netzinger
Agency/Co.: HGBD
Date Performed: 10/18/2012
Analysis Time Period: PM Peak Hour
Intersection: Gwinnett & Stiles
Area Type: All other areas
Jurisdiction: City of Savannah
Analysis Year: 2036
Project ID: Gwinnett Street Improvements, Stiles to West Boundary
E/W St: Gwinnett Street N/S St: Stiles Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	51	160	20	154	178	177	23	45	129	178	75	50
% Heavy Veh	2	2	0	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PK 15 Vol	14	43	5	42	48	48	6	12	35	48	20	14
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1800		1800	1800	1800		1800	1800	1800	1800	
ParkExist												
NumPark												
No. Lanes	0	1	0	1	1	1	0	1	1	1	1	0
LGConfig		LTR		L	T	R		LT	R	L	TR	
Lane Width		12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vol			10			50			60			10
Adj Flow		240		167	193	138		74	75	193	125	
%InSharedLn												
Prop LTs		0.229		1.000	0.000			0.338		1.000	0.000	
Prop RTs	0.046				0.000	1.000	0.000		1.000		0.344	
Peds Bikes	0				0		0				0	
Buses		0		0	0	0		0	0	0	0	
%InProtPhase							0.0					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Arriv. Type		3		3	3	3		3	3	3	3	
Unit Ext.		3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Ext of g		2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P	P	

Appendix B
HCM Analyses

	Thru	P			Thru	P	P
	Right	P			Right	P	P
	Peds				Peds		
WB	Left	P		SB	Left		P
	Thru	P			Thru		P
	Right	P			Right		P
	Peds				Peds		
NB	Right			EB	Right		
SB	Right			WB	Right		
Green		26.8				6.1	15.1
Yellow		3.0				3.0	3.0
All Red		1.0				1.0	1.0

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	51	160	20	154	178	177	23	45	129	178	75	50
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj flow	55	174	11	167	193	138	25	49	75	193	82	43
No. Lanes	0	1	0	1	1	1	0	1	1	1	1	0
Lane group		LTR		L	T	R		LT	R	L	TR	
Adj flow		240		167	193	138		74	75	193	125	
Prop LTs		0.229		1.000	0.000			0.338		1.000	0.000	
Prop RTs		0.046			0.000	1.000		0.000	1.000		0.344	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound				Northbound				Southbound			
LG		LTR			L	T	R			LT	R		L	TR		
So		1800			1800	1800	1800			1800	1800		1800	1800		
Lanes	0	1	0		1	1	1	0		1	1		1	1	0	
fW		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fHV		0.981			0.980	0.980	0.980			0.980	0.980		0.980	0.980		
fG		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fP		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fBB		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fA		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fLU		1.000			1.000	1.000	1.000			1.000	1.000		1.000	1.000		
fRT		0.994				1.000	0.850			1.000	0.850			0.948		
fLT		0.903			0.610	1.000				0.983			0.709	1.000		
Sec.										0.691						
fLpb		1.000			1.000	1.000				1.000			1.000	1.000		
fRpb		1.000				1.000	1.000			1.000	1.000			1.000		
S		1585			1077	1765	1500			1735	1500		1251	1674		
Sec.										1220						

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							

Perm							
Thru	LTR	240	1585	0.15	0.45	708	0.34
Right							
Westbound							
Prot							
Perm							
Left	L	167	1077	# 0.16	0.45	481	0.35
Prot							
Perm							
Thru	T	193	1765	0.11	0.45	788	0.24
Right	R	138	1500	0.09	0.45	670	0.21
Northbound							
Prot							
Perm							
Left							
Prot		74	1735	# 0.04	0.102	176	0.42
Perm		0	1220	0.00	0.318	388	0.00
Thru	LT	74			0.42	564	0.13
Right	R	75	1500	0.05	0.42	630	0.12
Southbound							
Prot							
Perm							
Left	L	193	1251	# 0.15	0.25	315	0.61
Prot							
Perm							
Thru	TR	125	1674	0.07	0.25	421	0.30
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.35
Total lost time per cycle, L = 12.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.44

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	0.34	0.45	10.8	1.000	708	0.50	1.3	0.0	12.1	B	12.1	B
Westbound												
L	0.35	0.45	10.9	1.000	481	0.50	2.0	0.0	12.8	B		
T	0.24	0.45	10.3	1.000	788	0.50	0.7	0.0	11.1	B	11.6	B
R	0.21	0.45	10.1	1.000	670	0.50	0.7	0.0	10.8	B		
Northbound												
LT	0.13	0.42	10.7	1.000	564	0.50	0.5	0.0	11.2	B	11.1	B
R	0.12	0.42	10.6	1.000	630	0.50	0.4	0.0	11.0	B		
Southbound												
L	0.61	0.25	19.9	1.000	315	0.50	8.6	0.0	28.5	C		
TR	0.30	0.25	18.2	1.000	421	0.50	1.8	0.0	20.0-	B	25.1	C

Intersection delay = 15.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			

Total actual green time for LT lane group, G (s)			26.8	15.1
Effective permitted green time for LT lane group, g(s)			26.8	15.1
Opposing effective green time, go (s)			26.8	25.2
Number of lanes in LT lane group, N			1	1
Number of lanes in opposing approach, No			1	1
Adjusted LT flow rate, VLT (veh/h)			167	193
Proportion of LT in LT lane group, PLT			1.000	1.000
Proportion of LT in opposing flow, PLTo			0.23	0.34
Adjusted opposing flow rate, Vo (veh/h)			240	74
Lost time for LT lane group, tL			4.00	4.00
Computation				
LT volume per cycle, LTC=VLTC/3600			2.78	3.22
Opposing lane util. factor, fLUo	1.000	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)			4.00	1.23
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g			0.0	0.0
Opposing platoon ratio, Rpo (refer Exhibit 16-11)			1.00	1.00
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]			0.55	0.58
gq, (see Exhibit C16-4,5,6,7,8)			3.59	0.00
gu=g-gq if gq>=gf, or = g-gf if gq<gf			23.21	15.10
n=Max(gq-gf)/2,0)			1.79	0.00
PTHo=1-PLTo			0.77	0.66
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]			1.00	1.00
EL1 (refer to Exhibit C16-3)			1.64	1.41
EL2=Max((1-Ptho**n)/Plto, 1.0)			1.63	1.00
fmin=2(1+PL)/g or fmin=2(1+Pl)/g			0.15	0.26
gdiff=max(gq-gf,0)			3.59	0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)			0.61	0.71
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT			0.610	0.709

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)		26.8		25.2	
Effective permitted green time for LT lane group, g(s)		26.8		19.1	
Opposing effective green time, go (s)		26.8		15.1	
Number of lanes in LT lane group, N		1		1	
Number of lanes in opposing approach, No		1		1	
Adjusted LT flow rate, VLT (veh/h)		55		25	
Proportion of LT in LT lane group, PLT		0.229	0.000	0.338	0.000
Proportion of LT in opposing flow, PLTo		0.00		0.00	
Adjusted opposing flow rate, Vo (veh/h)		193		125	
Lost time for LT lane group, tL		4.00		4.00	
Computation					
LT volume per cycle, LTC=VLTC/3600		0.92		0.42	
Opposing lane util. factor, fLUo		1.000	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)		3.22		2.08	
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g		7.7		0.0	
Opposing platoon ratio, Rpo (refer Exhibit 16-11)		1.00		1.00	
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]		0.55		0.75	
gq, (see Exhibit C16-4,5,6,7,8)		2.43		3.35	
gu=g-gq if gq>=gf, or = g-gf if gq<gf		19.10		15.75	

n=Max(gq-gf)/2,0)	0.00	1.68
PTHo=1-PLTo	1.00	1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]	0.23	0.34
EL1 (refer to Exhibit C16-3)	1.69	1.57
EL2=Max((1-Ptho**n)/Plto, 1.0)		
fmin=2(1+PL)/g or fmin=2(1+Pl)/g	0.09	0.14
gdiff=max(gq-gf,0)	0.00	0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)	0.90	0.69
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**		
Left-turn adjustment, fLT	0.903	0.691

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				

Appendix B

HCM Analyses

Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LTR	0.0	0.00	16.6	10.8	0.00	0.0	0.0	12.1
	0.0						0.0	
Westbound								
L	0.0	0.00	16.6	10.9	0.00	0.0	0.0	12.8
T	0.0	0.00	16.6	10.3	0.00	0.0	0.0	11.1
R	0.0	0.00	16.6	10.1	0.00	0.0	0.0	10.8
Northbound								
	0.0						0.0	
LT	0.0	0.00	17.4	10.7	0.00	0.0	0.0	11.2
R	0.0	0.00	17.4	10.6	0.00	0.0	0.0	11.0
Southbound								
L	0.0	0.00	22.5	19.9	0.00	0.0	0.0	28.5
TR	0.0	0.00	22.5	18.2	0.00	0.0	0.0	20.0-
	0.0						0.0	

Intersection Delay 15.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup		LTR		L	T	R		LT	R	L	TR	
Init Queue		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Flow Rate		240		167	193	138		74	75	193	125	
So		1800		1800	1800	1800		1800	1800	1800	1800	
No.Lanes	0	1	0	1	1	1	0	1	1	1	1	0
SL		1585		1077	1765	1500		1344	1500	1251	1674	
LnCapacity		708		481	788	670		564	630	315	421	
Flow Ratio		0.2		0.2	0.1	0.1		0.1	0.1	0.2	0.1	
v/c Ratio		0.34		0.35	0.24	0.21		0.13	0.12	0.61	0.30	
Grn Ratio		0.45		0.45	0.45	0.45		0.42	0.42	0.25	0.25	
I Factor		1.000			1.000			1.000			1.000	
AT or PVG		3		3	3	3		3	3	3	3	
Pltn Ratio		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
PF2		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Q1		2.6		1.8	2.0	1.4		0.7	0.8	2.8	1.7	
kB		0.7		0.5	0.7	0.6		0.6	0.6	0.4	0.5	
Q2		0.3		0.3	0.2	0.2		0.1	0.1	0.6	0.2	
Q Average		3.0		2.1	2.2	1.6		0.8	0.8	3.4	1.9	
Q Spacing		25.0		25.0	25.0	25.0		25.0	25.0	25.0	25.0	
Q Storage		500		100	500	100		400	100	100	500	

Appendix B
HCM Analyses

Q S Ratio	0.1	0.5	0.1	0.4	0.1	0.2	0.9	0.1	
70th Percentile Output:									
fB%	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
BOQ	3.7	2.7	2.8	2.0	1.0	1.1	4.3	2.4	
QSRatio	0.2	0.7	0.1	0.5	0.1	0.3	1.1	0.1	
85th Percentile Output:									
fB%	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.6	
BOQ	4.6	3.3	3.6	2.5	1.3	1.4	5.3	3.0	
QSRatio	0.2	0.8	0.2	0.6	0.1	0.4	1.3	0.2	
90th Percentile Output:									
fB%	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	
BOQ	5.2	3.8	4.1	2.9	1.6	1.6	6.0	3.5	
QSRatio	0.3	1.0	0.2	0.7	0.1	0.4	1.5	0.2	
95th Percentile Output:									
fB%	2.2	2.3	2.2	2.3	2.5	2.4	2.1	2.3	
BOQ	6.4	**4.7**	**5.0**	**3.7**	2.0	2.1	7.2	4.3	
QSRatio	0.3	1.2	0.3	0.9	0.1	0.5	1.8	0.2	
98th Percentile Output:									
fB%	2.5	2.7	2.7	2.8	3.0	3.0	2.5	2.7	
BOQ	7.5	5.6	5.9	4.4	2.4	2.5	8.4	5.1	
QSRatio	0.4	1.4	0.3	1.1	0.2	0.6	2.1	0.3	

ERROR MESSAGES

No errors to report.

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	AM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2012
Project ID: 2012 AM	

Traffic Characteristics

Annual average daily traffic, AADT	7680	vpd
Planning analysis hour factor, K	0.052	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	7680	vpd
Two-way hourly volume	399	vph
Hourly directional volume	207	vph
Through-volume 15-min. flow rate	89	v
Running time	46.0	sec
v/c ratio	0.10	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.1	sec
Filtering/metering factor, I	0.998	
Incremental delay	0.2	sec
Control delay	5.4	sec/v
Total travel speed, Sa	25.4	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	Mid-day Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2012
Project ID: 2012 MD	

Traffic Characteristics

Annual average daily traffic, AADT	7680	vpd
Planning analysis hour factor, K	0.061	
Directional distribution factor, D	0.530	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	7680	vpd
Two-way hourly volume	468	vph
Hourly directional volume	248	vph
Through-volume 15-min. flow rate	107	v
Running time	46.0	sec
v/c ratio	0.12	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.2	sec
Filtering/metering factor, I	0.997	
Incremental delay	0.3	sec
Control delay	5.5	sec/v
Total travel speed, Sa	25.3	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	PM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2012
Project ID: 2012 PM	

Traffic Characteristics

Annual average daily traffic, AADT	7680	vpd
Planning analysis hour factor, K	0.096	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	7680	vpd
Two-way hourly volume	737	vph
Hourly directional volume	383	vph
Through-volume 15-min. flow rate	166	v
Running time	46.0	sec
v/c ratio	0.19	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.4	sec
Filtering/metering factor, I	0.989	
Incremental delay	0.5	sec
Control delay	5.9	sec/v
Total travel speed, Sa	24.9	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	AM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2016
Project ID: 2016 AM	

Traffic Characteristics

Annual average daily traffic, AADT	8050	vpd
Planning analysis hour factor, K	0.052	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	8050	vpd
Two-way hourly volume	418	vph
Hourly directional volume	217	vph
Through-volume 15-min. flow rate	94	v
Running time	46.0	sec
v/c ratio	0.11	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.1	sec
Filtering/metering factor, I	0.998	
Incremental delay	0.3	sec
Control delay	5.4	sec/v
Total travel speed, Sa	25.4	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	Mid-day Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2016
Project ID: 2016 MD	

Traffic Characteristics

Annual average daily traffic, AADT	8050	vpd
Planning analysis hour factor, K	0.061	
Directional distribution factor, D	0.530	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	8050	vpd
Two-way hourly volume	491	vph
Hourly directional volume	260	vph
Through-volume 15-min. flow rate	113	v
Running time	46.0	sec
v/c ratio	0.13	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.2	sec
Filtering/metering factor, I	0.996	
Incremental delay	0.3	sec
Control delay	5.5	sec/v
Total travel speed, Sa	25.2	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	PM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2016
Project ID: 2016 PM	

Traffic Characteristics

Annual average daily traffic, AADT	8050	vpd
Planning analysis hour factor, K	0.096	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	8050	vpd
Two-way hourly volume	772	vph
Hourly directional volume	401	vph
Through-volume 15-min. flow rate	174	v
Running time	46.0	sec
v/c ratio	0.20	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.5	sec
Filtering/metering factor, I	0.988	
Incremental delay	0.5	sec
Control delay	6.0	sec/v
Total travel speed, Sa	24.8	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	AM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2036
Project ID: 2036 AM	

Traffic Characteristics

Annual average daily traffic, AADT	10170	vpd
Planning analysis hour factor, K	0.052	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	10170	vpd
Two-way hourly volume	528	vph
Hourly directional volume	274	vph
Through-volume 15-min. flow rate	119	v
Running time	46.0	sec
v/c ratio	0.14	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.2	sec
Filtering/metering factor, I	0.996	
Incremental delay	0.3	sec
Control delay	5.6	sec/v
Total travel speed, Sa	25.2	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	Mid-day Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2036
Project ID: 2036 MD	

Traffic Characteristics

Annual average daily traffic, AADT	10170	vpd
Planning analysis hour factor, K	0.061	
Directional distribution factor, D	0.530	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

Results

Annual average daily traffic, AADT	10170	vpd
Two-way hourly volume	620	vph
Hourly directional volume	328	vph
Through-volume 15-min. flow rate	142	v
Running time	46.0	sec
v/c ratio	0.16	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.3	sec
Filtering/metering factor, I	0.993	
Incremental delay	0.4	sec
Control delay	5.7	sec/v
Total travel speed, Sa	25.1	mph
Total urban street LOS	C	

Appendix B
HCM Analyses

HCS+: Urban Streets Release 5.4

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	Jeff Netzinger
Agency/Co.:	HGBD
Date Performed:	9/7/2012
Analysis Time Period:	PM Peak
Urban Street:	Gwinnett
Direction of Travel:	
Jurisdiction:	City of Savannah
Analysis Year:	2036
Project ID: 2036 PM	

Traffic Characteristics

Annual average daily traffic, AADT	10170	vpd
Planning analysis hour factor, K	0.096	
Directional distribution factor, D	0.520	
Peak-hour factor, PHF	0.920	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	60	%

Roadway Characteristics

Number of through lanes one direction, N	1	
Free flow speed, FFS	40	mph
Urban class	2	
Section length	0.40	miles
Median	No	
Left-turn bays	No	

Signal Characteristics

Signalized intersections	2	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	60.0	sec
Effective green ratio, g/C	0.600	

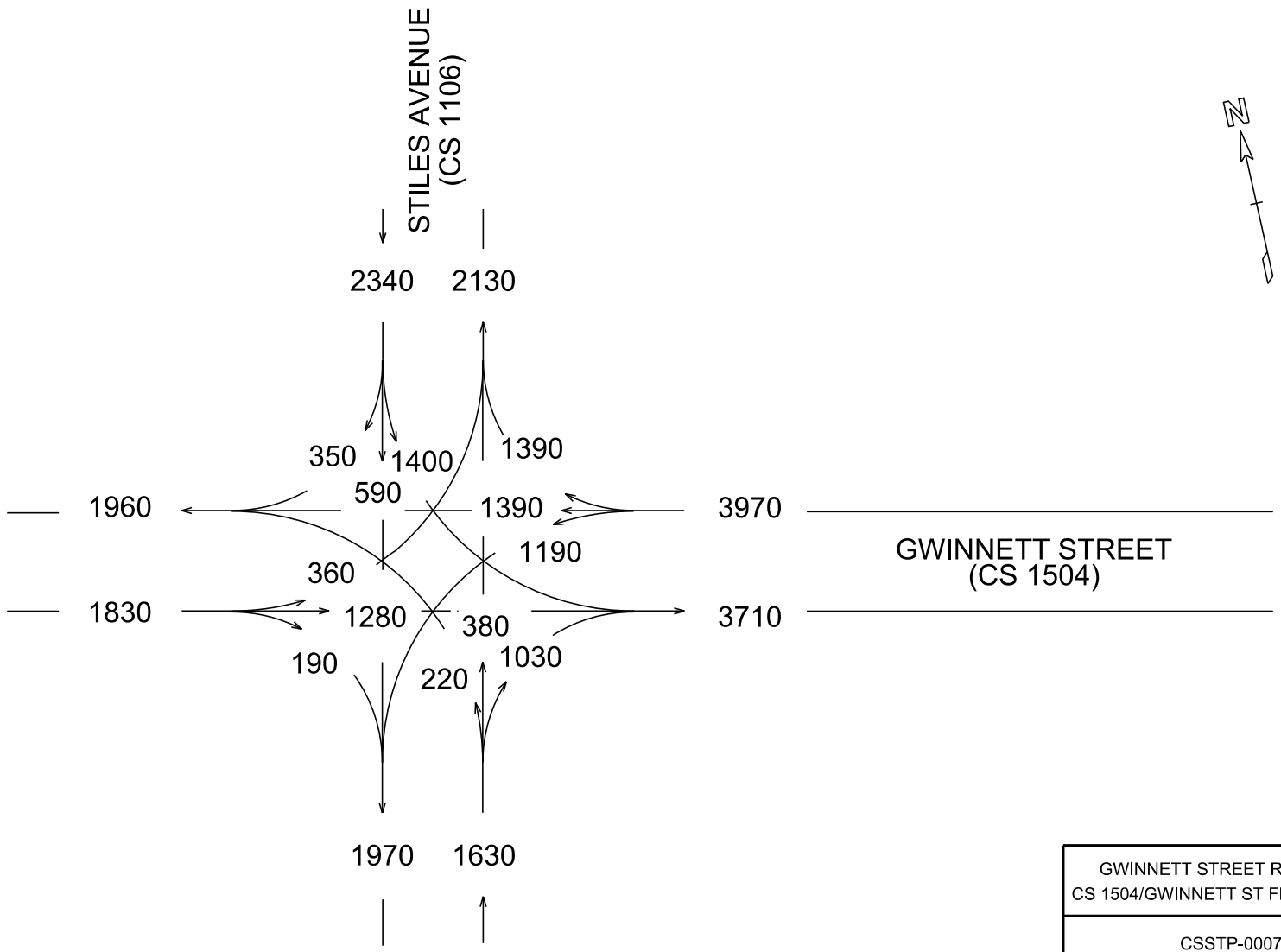
Results

Annual average daily traffic, AADT	10170	vpd
Two-way hourly volume	976	vph
Hourly directional volume	507	vph
Through-volume 15-min. flow rate	220	v
Running time	46.0	sec
v/c ratio	0.25	
Through capacity	863	vph
Progression factor, PF	1.000	
Uniform delay	5.7	sec
Filtering/metering factor, I	0.977	
Incremental delay	0.7	sec
Control delay	6.4	sec/v
Total travel speed, Sa	24.5	mph
Total urban street LOS	C	

APPENDIX C

Traffic Diagrams

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

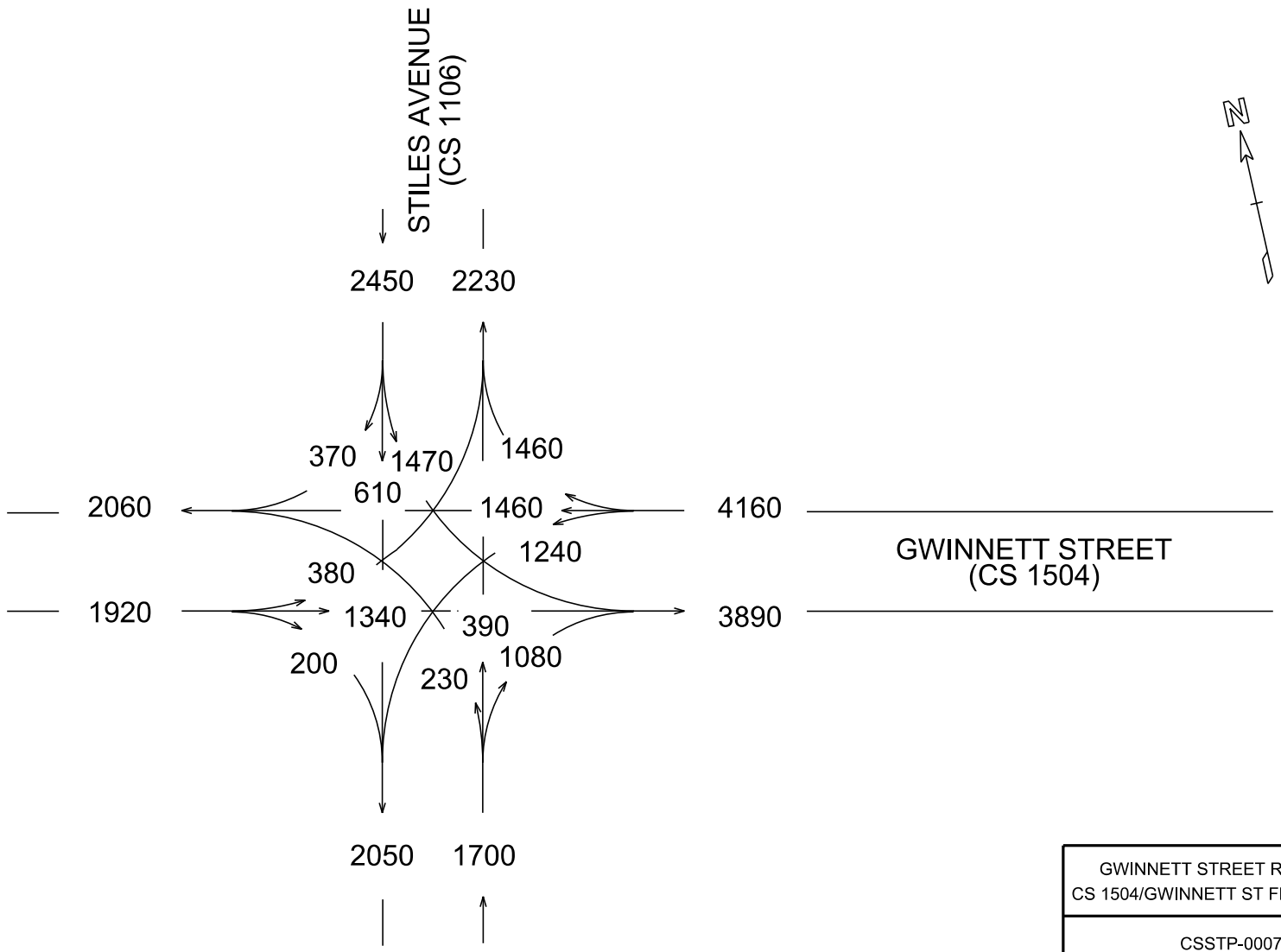
TRAFFIC DIAGRAM
EXISTING YEAR 2012
AVERAGE DAILY TRAFFIC

TRUCKS:
24 HOUR = 10.3%
SU = 9.3%
COMB = 1.0%

JKN

OCTOBER 23, 2012

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



NOTE: PROJECTED 2016 AND 2036 VOLUMES ARE THE SAME FOR BOTH THE BUILD AND NO-BUILD CONDITIONS.

GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

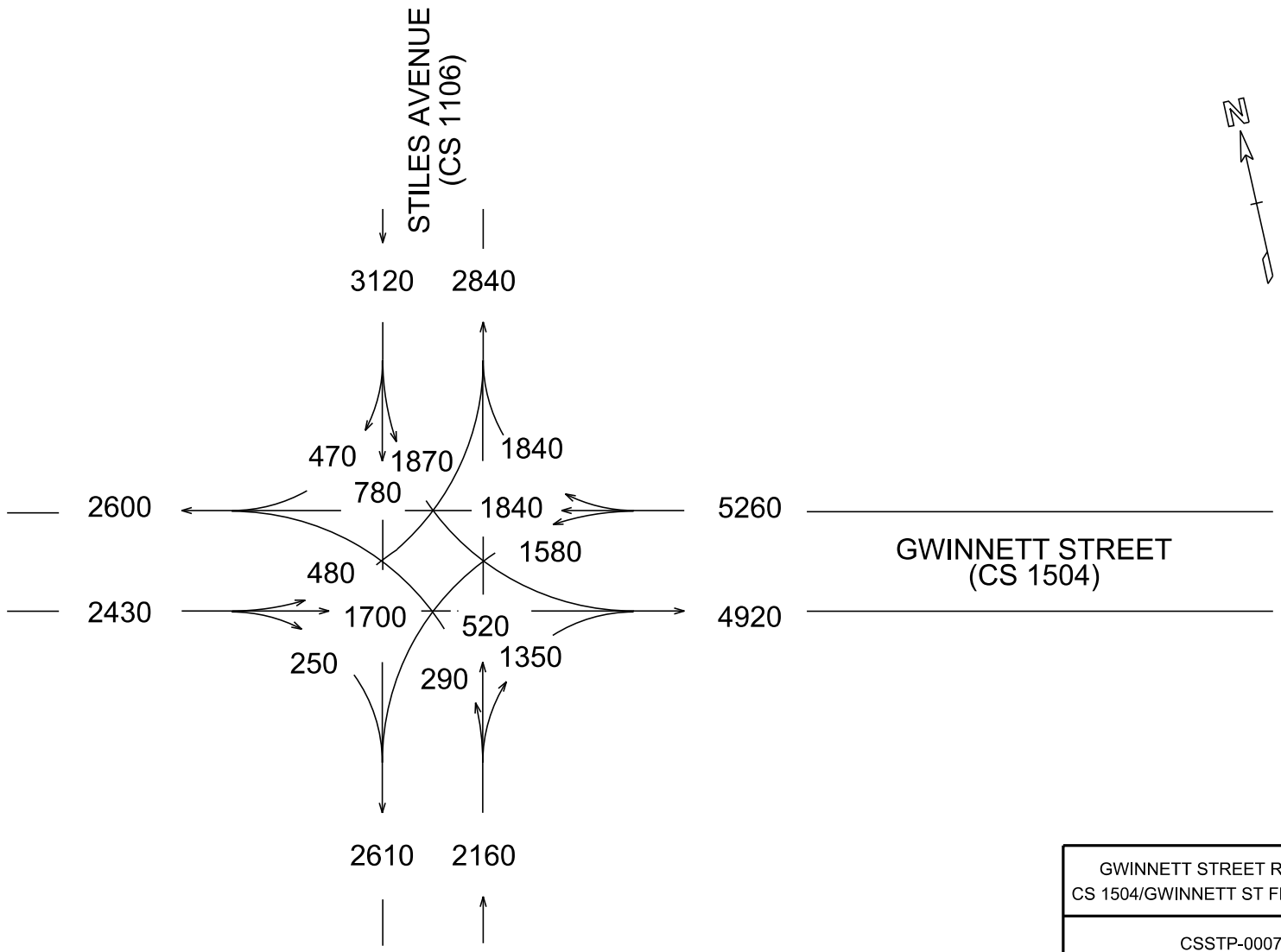
TRAFFIC DIAGRAM
BASE YEAR 2016
AVERAGE DAILY TRAFFIC

TRUCKS:
24 HOUR = 10.3%
SU = 9.3%
COMB = 1.0%

JKN

OCTOBER 23, 2012

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



NOTE: PROJECTED 2016 AND 2036 VOLUMES ARE THE SAME FOR BOTH THE BUILD AND NO-BUILD CONDITIONS.

GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

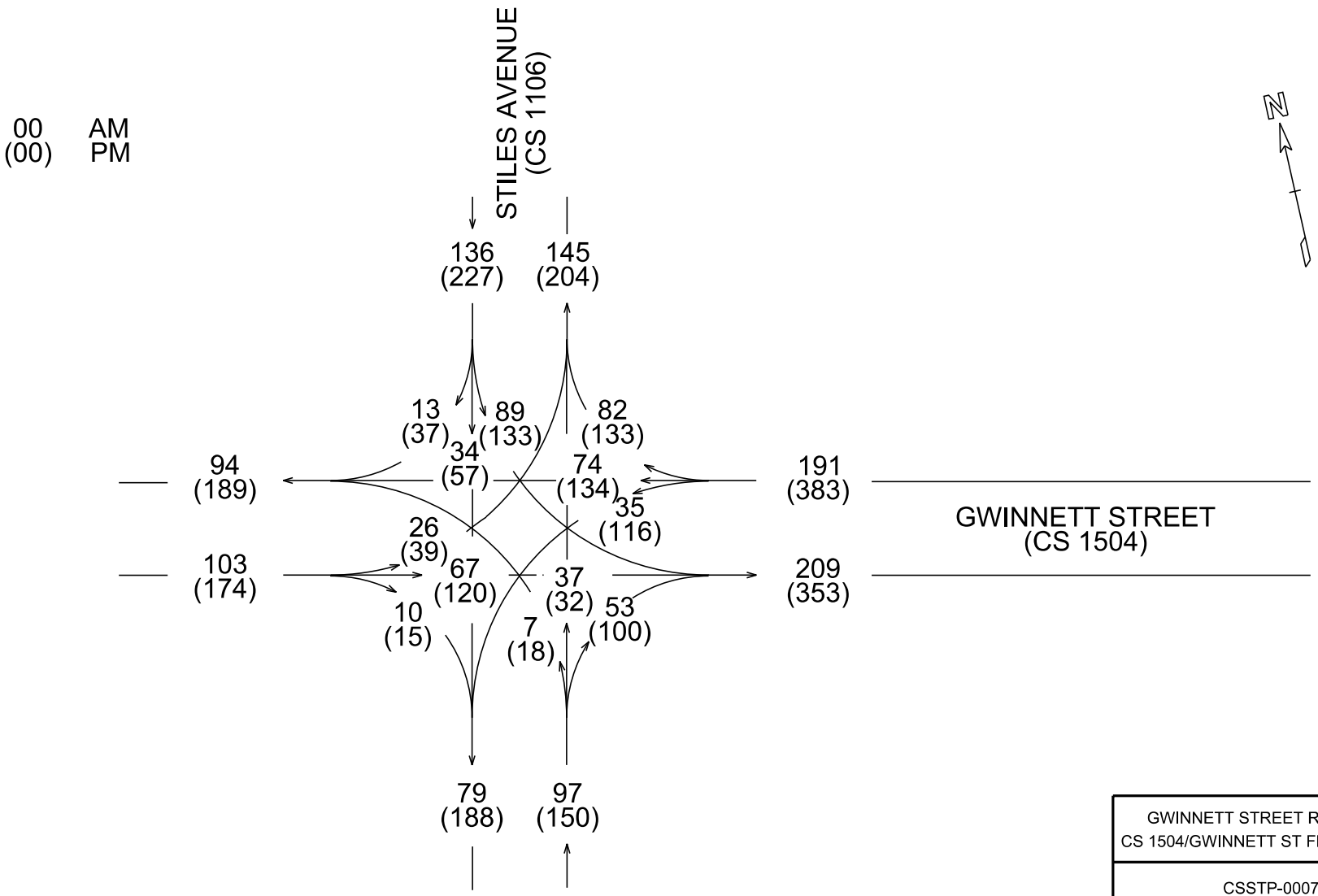
TRAFFIC DIAGRAM
DESIGN YEAR 2036
AVERAGE DAILY TRAFFIC

TRUCKS:
24 HOUR = 10.3%
SU = 9.3%
COMB = 1.0%

JKN

OCTOBER 23, 2012

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

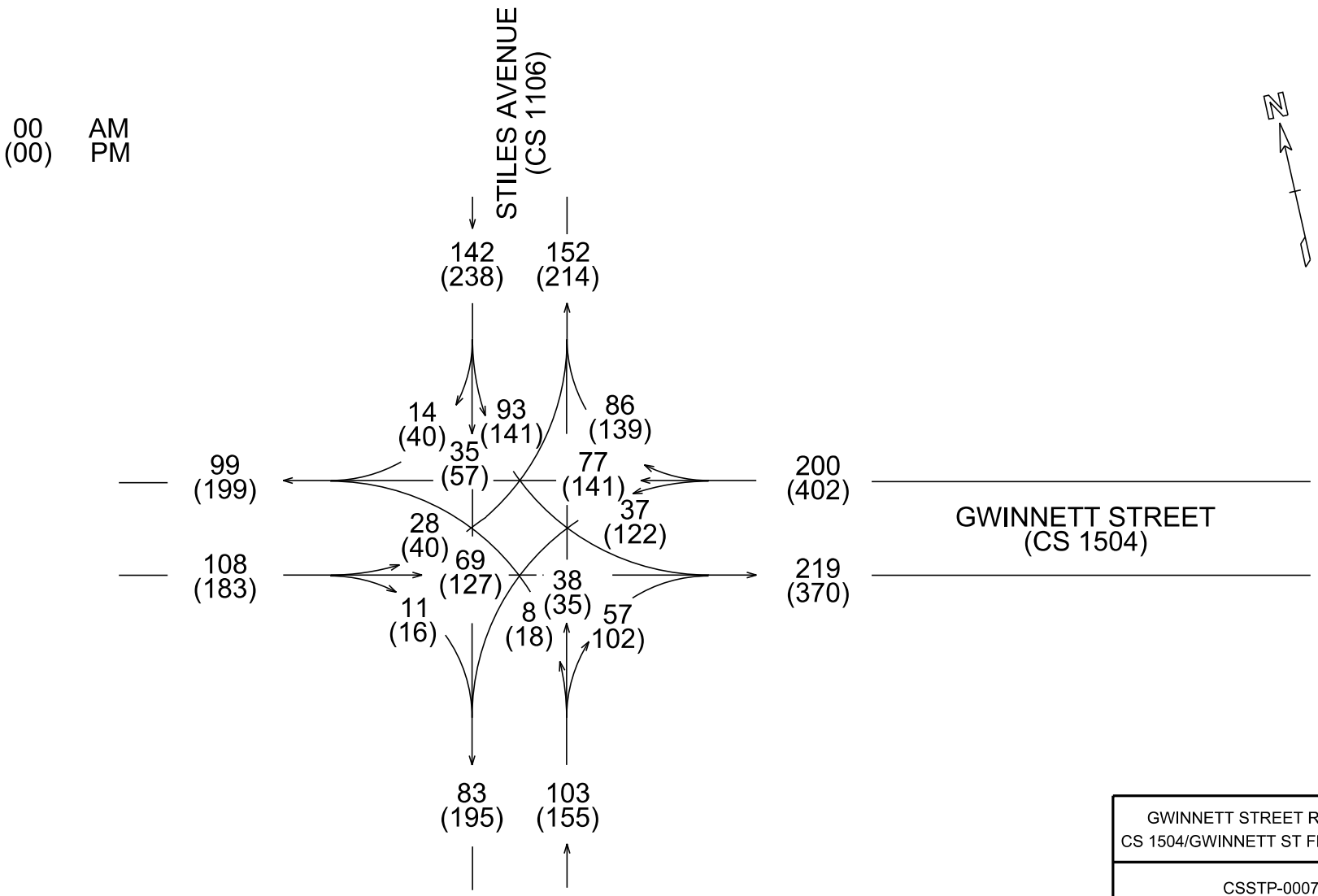
TRAFFIC DIAGRAM
EXISTING YEAR 2012
PEAK HOUR VOLUMES

TRUCKS:
AM = 12.8% (11.0% SU / 1.8% COMB)
PM = 6.3% (5.1% SU / 1.2% COMB)

JKN

OCTOBER 23, 2012

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



NOTE: PROJECTED 2016 AND 2036 VOLUMES ARE THE SAME FOR BOTH THE BUILD AND NO-BUILD CONDITIONS.

OCTOBER 23, 2012

GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

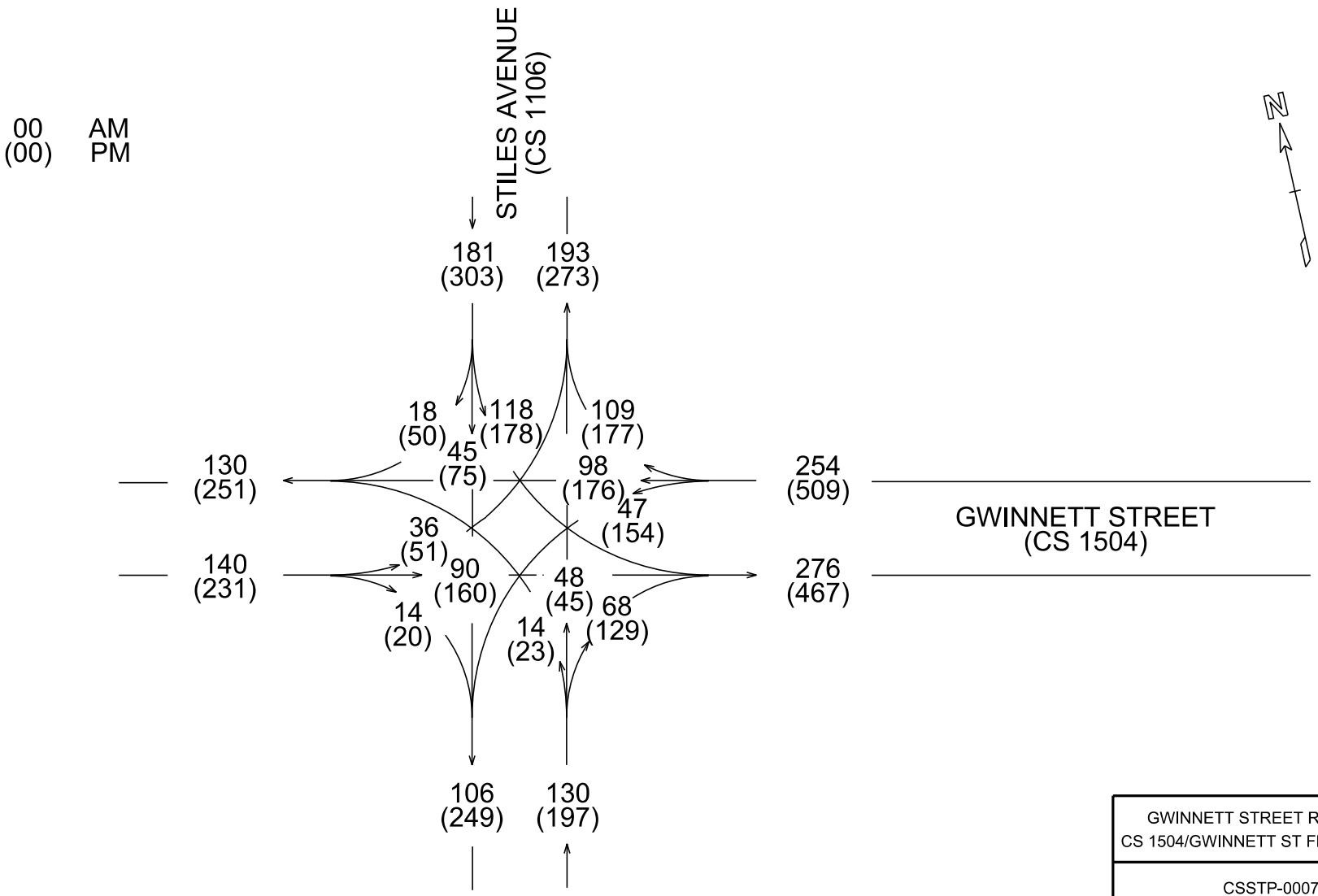
CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

TRAFFIC DIAGRAM
BASE YEAR 2016
PEAK HOUR VOLUMES

TRUCKS:
AM = 12.8% (11.0% SU / 1.8% COMB)
PM = 6.3% (5.1% SU / 1.2% COMB)

JKN

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING



NOTE: PROJECTED 2016 AND 2036 VOLUMES ARE THE SAME FOR BOTH THE BUILD AND NO-BUILD CONDITIONS.

OCTOBER 23, 2012

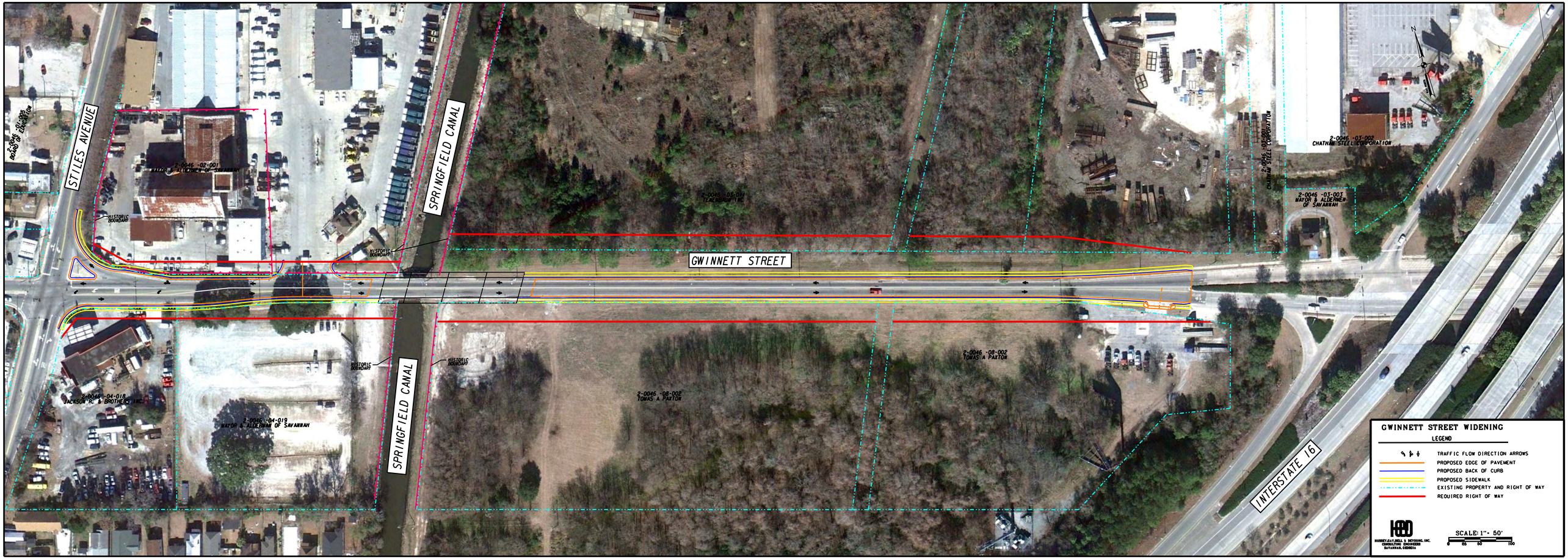
GWINNETT STREET RECONSTRUCTION
CS 1504/GWINNETT ST FM STILES AVE TO I-16

CSSTP-0007-00 (402)
P.I. 0007402
CHATHAM COUNTY

TRAFFIC DIAGRAM
DESIGN YEAR 2036
PEAK HOUR VOLUMES

TRUCKS:
AM = 12.8% (11.0% SU / 1.8% COMB)
PM = 6.3% (5.1% SU / 1.2% COMB)

JKN


STILES AVENUE
SPRINGFIELD CANAL
GWINNETT STREET
INTERSTATE 16
2-0046 -02-001
MAYOR & ALDERMEN OF SAVANNAH
HISTORIC BOUNDARY
2-0046 -03-001
TERCHAUN INC
2-0046 -03-002
CHATHAM STEEL CORPORATION
2-0046 -03-003
MAYOR & ALDERMEN OF SAVANNAH
2-0046 -04-018
JACKSON R. & BROTHERS INC.
2-0046 -04-019
MAYOR & ALDERMEN OF SAVANNAH
2-0046 -08-002
TOMAS A PARTON
GWINNETT STREET WIDENING
LEGEND
TRAFFIC FLOW DIRECTION ARROWS
PROPOSED EDGE OF PAVEMENT
PROPOSED BACK OF CURB
PROPOSED SIDEWALK
EXISTING PROPERTY AND RIGHT OF WAY
REQUIRED RIGHT OF WAY
HUSSEY, GAY, BELL & DEYOUNG, INC.
CONSULTING ENGINEERS
SAVANNAH, GEORGIA
SCALE: 1" = 50'
0 25 50 100